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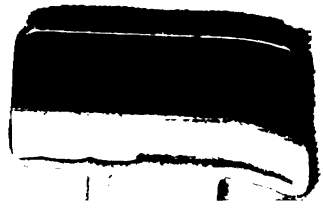
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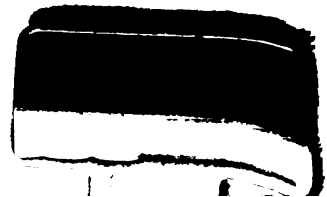
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APPLETON'S NEW PRACTICAL CYCLOPEDIA

A NEW WORK OF REFERENCE
BASED UPON THE BEST AUTHORITIES, AND SYSTEMATICALLY ARRANGED FOR USE IN HOME AND SCHOOL

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UNITED STATES COMMISSIONER OF EDUCATION

VOLUME II

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KEY TO PRONUNCIATION

ā, as in *fate.*
ă, as in *fat.*
å, as in *fall.*
ä, as in *father.*
ã, as in *welfare.*

ē, as in *meet.*
ĕ, as in *met.*
ė, as in *her* and *eu* in French *-eur.*

ī, as in *five.*
ĭ, as in *it.*

ō, as in *sober.*
ŏ, as in *not.*
o͞o, as in *fool* or *spoon,* or as *u* in *rule.*
o͝o, as in *foot.*
ȯ, as in *Göthe* and *eu* in French *neuf.*

ū, as in *mule.*
ŭ, as in *but.*
u͝o, produced with lips rounded to utter *oo* and tongue placed as in uttering *e.*
u̇, as in *burn* or *burg.*

ch, as in German *ich.*

kh, as *ch* in German *nacht* and Scotch *loch,* and as *g* in German *tag.*

th, as in *thin.*

th, as in *though.*

ṅ, French nasal *n* and *m*; pronounce *ang, ong, ung,* etc., in usual way, but without sounding the *g.*

ñ, Spanish n-y, as in cañon; French and Italian —gn, as in Boulogne.

APPLETON'S

NEW PRACTICAL CYCLOPEDIA

VOLUME II

Circe (sėr'sē), a sorceress of classic mythology, celebrated for her skill in magic arts; sister of Pasiphaë. According to Homer, she was a daughter of the Sun, and lived on the island of Ææa, where she transformed many men into swine and other beasts by her drugs and incantations.

Circle (sėr'k'l), in geometry, a plane figure bounded by a curved line which is everywhere equally distant from a point within called the center. The curved line which bounds the circle is called the circumference. The distance from the center to the circumference is called the radius, and any two radii which together form a straight line constitute the diameter.

Circle of Perpet'ual Appari'tion, lesser circle of the celestial sphere; parallel to the equator; increases with the latitude of the place where the observer is stationed. All stars included in it are always above the horizon. These are called circumpolar stars.

Cir'cleville, capital of Pickaway Co., Ohio; on the Scioto River; 25 m. S. of Columbus; occupies the site of interesting ancient works, consisting of a circle and square, perfect in form. Camp Charlotte, where Lord Dunmore encamped, 1774, and made a treaty of peace with Indians, is 7 m. SE. of Circleville. Pop. (1900) 6,991.

Circuit (sėr'kĭt), in electricity, the path of the current; in magnetism, the path of the lines of force which constitute the magnetic field to which the lines in question belong. An electrical circle is closed when no portion of it offers an infinite resistance to the flow of electricity. It is an open circuit when any portion possesses so high a resistance as to prevent the passage of an appreciable current. The electrical circuit may be said to be made up of the lines of flow, each of which is a closed curve. No two lines come into contact at any point, and all of them are everywhere perpendicular to the equipotential surfaces. The total number of lines of flow in any circuit is at every part of it the same; but their distribution depends upon the specific conductivity of the material of which the circuit is composed.

Cir'cular Num'bers, numbers whose powers have their last digits the same as their own; such are numbers ending in 0, 1, 5, 6.

Circular Points at Infin'ity, the two imaginary points in which any circle intersects the infinitely distant right line in its plane.

Cir'culating, or Recur'ring Dec'imal, decimal in which certain digits are continually repeated. Thus, .15723723...., *ad infinitum*, is a circulating decimal of which the figures 723 constitute the recurring period, called also the repetend.

Circula'tion of the Blood, the passage of the blood from the heart to the capillaries and thence back to the heart. From the left ventricle of the heart the blood passes successively into the aorta, the arteries, the systemic capillaries, the veins, the right auricle, and the

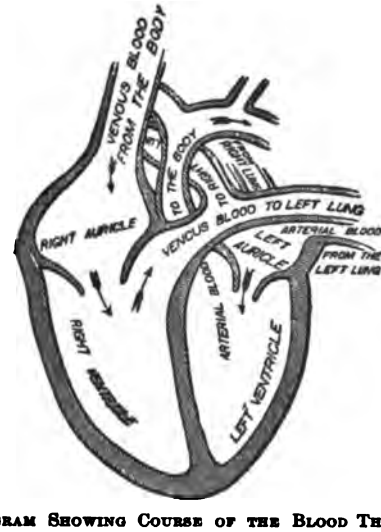


DIAGRAM SHOWING COURSE OF THE BLOOD THROUGH THE HEART.

right ventricle, by which it is forced into the pulmonary arteries. It then passes into the pulmonary capillaries, where it is aërated, and then into the pulmonary veins, which empty into the left auricle; this forces the blood into the left ventricle, from which it set out. It must be understood that the blood which thus returns to the heart is not identical in material with that which was thrown by it into the arteries; it is blood

of the same character and constitution, but it is almost entirely a new material. It has passed through two capillary systems, and from the systemic has received a large supply of fluids which are the results of the transformations produced by the various processes of nutrition. See BLOOD.

Although it had been partially recognized long before, the circulation of the blood was first demonstrated by William Harvey, 1616, taught in lectures, 1619, and published, 1628. His observations were so accurate, and his reasonings so good, that his theory of the circulation is now adopted with little change.

Circumcision (sẽr-kŭm-sĭzh'ŭn), ancient Eastern practice, consisting in cutting off the prepuce in males and the internal labia in females. Among the Jews it is a strictly religious rite, confined to males, and is performed the eighth day after birth. Anciently it was obligatory also on proselytes and all slaves of Jewish masters. Female circumcision (removal of the clitoris) is practiced in the Mohammedan world.

Circumpo'lar Stars, stars which revolve within the circle of perpetual apparition, and appear to move around the pole, and complete their diurnal circles without setting. The number of stars so circumstanced increases with the latitude of the place, or, in other words, with the elevation of the pole above the horizon of the observer.

Circumvalla'tion, an intrenchment or series of defensive works erected by a besieging army, facing outward from the place invested or besieged, is called a line of circumvallation; consists of a line of field works, sometimes connected by a parapet or a rampart; designed to defend the besieging army against an attack from a hostile army operating in the rear.

Circus (sẽr'kŭs), in Roman archæology, an open space for the display of physical contests and sports, especially chariot racing. Under the empire the circuses of Rome were adorned in the richest manner with architectural screens and arcades, sculpture, flagstaffs, and trophies, and abundant use of colors and gold. The Circus Maximus remained the largest, but that of Caligula and Nero, which stood on the Vatican Hill where is now the sacristy of St. Peter, that of Hadrian, the Circus Flaminius, and others, were perhaps as rich in their architecture and appointments as the first named. The circus of Maxentius, situated outside the walls of Rome on the SE., still remains partly erect, but all those within the walls have entirely disappeared.

Cirripedia (sĭr-rĭ-pē'dĭ-ă). See BARNACLE.

Cir'rus. See CLOUDS.

Cis, Latin preposition meaning "on this side"; prefixed to rivers or mountains to form adjectives; as Cisalpine (on this side of the Alps); Cispadane (on this side of the Po). These terms are used with reference to Rome.

Cisal'pine Repub'lic, Italian state, founded by Napoleon, 1797; and recognized by Austria in the Treaty of Campo Formio; included Lombardy, the Venetian territory W. of the Adige, the legations of Bologna, Ferrara and Romagna, the Duchy of Modena, Mantua, Rovigo, etc.; area, over 16,000 sq. m.; pop. 3,500,000; taken by the Allies, 1799, but regained by Bonaparte, 1800. It received the name of Italian Republic, January, 1802, and chose Bonaparte as president; March, 1805, became the Kingdom of Italy, with Napoleon as king and Eugene Beauharnais as viceroy; it continued as such till 1814, when its territories were divided.

Cisleithania (sĭs-lĭ-thā'nĕ-ă). See AUSTRIA-HUNGARY.

Cistercians (sĭs-tẽr'shănz), or **Ber'nardines**, order of Benedictine monks and nuns, founded, 1098. Through the influence chiefly of St. Bernard of Clairvaux, who became a monk of Citeaux, 1113, the order in about a century had more than 1800 abbeys. As long as St. Bernard lived the order occupied a conspicuous place in the world, but by the middle of the thirteenth century it had passed its culmination, and its historical mission was inherited by the Dominicans and the Franciscans. Before the Reformation many of its convents had ceased to exist; by 1872 only a few convents existed, chiefly in France and Austria.

Cita'tion, in law: (1) A summons issued by a court of competent jurisdiction directing a person to appear before it. The service of the citation gives the court jurisdiction over the parties cited or summoned. This citation is chiefly used in England in the ecclesiastical courts, and in the U. S. in surrogate or probate courts, whose jurisdiction corresponds in part to that formerly exercised by the English ecclesiastical courts, and in the U. S. Supreme Court in practice on writs of error. (2) A reference to precedents or authorities in support of a proposition of law.

Cit'ies of Ref'uge, six of the forty-eight Levitical cities to which the involuntary homicide might flee, and live safe from the avenger of blood till the death of the high priest released him from this quasicaptivity (Num. xxxv, 6, 13, 34; Deut. xix, 1, 10; Josh. xx). There were three on each side of Jordan, as nearly as possible opposite each other. On the E. side: (1) Bezer, not yet identified; (2) Ramoth-Gilead, probably Remiun; (3) Golan, now Jaulan. On the W. side; (1) Kedesh, now Kedes; (2) Shechem, now Nabulus; (3) Hebron. The road to them was plainly marked and kept open. There is no biblical instance of their use.

Cit'izen, in modern law, a person who owes an indefeasible allegiance to a state or nation, and who is entitled to certain rights and privileges which appertain to freemen. This view prevailed as early as the time of Bodin (1576 A.D.), who defines a citizen to be "a free subject holding of the sovereignty of another man." Citizenship, in this sense, is not to be confounded with the elective franchise or the holding of offices of government. Children, the insane, and the nonvoting classes in general

are citizens. The leading mode of acquiring citizenship is by birth in the country or under a state of allegiance. Birth in the country confers citizenship without reference to the citizenship of the parent, who at the moment of birth owes at least a local allegiance, and, though an alien, is temporarily a subject, except in the case of foreign ambassadors and ministers. An alien may be made a citizen by the act of a state or a nation coöperating with his own act. Sometimes this citizenship is complimentary or honorary; usually it is attended with true, or intended, renunciation of foreign citizenship. See ALIEN; NATURALIZATION.

Cit'ron, fruit of *Citrus medica*, a small tree of the orange tribe, and now held by most botanists to belong to the same natural species as the lemon and the sour lime. The fruit is like an exaggerated lemon and sometimes weighs several pounds. The rind is very aromatic, and is used for the making of conserves. The mildly acid juice is employed in the flavoring of liquors. The name citron is also used for a variety of watermelon, the rind of which is used, like that of the true citron, for preserves. This watermelon is characterized by a medium sized, very hard, inedible fruit, which has a small and firm white core. The fruit thrives throughout the U. S.

Citronel'la, Oil of. See GRASS OIL.

Cit'rus, a genus of evergreen trees and shrubs of the family *Rutaceæ*, natives of tropical India, but long cultivated in all warm climates. The orange, *C. aurantium*, the lemon, *C. limonum*, lime, *C. limetta*, shaddock or grapefruit, *C. decumana*, kumquat, *C. japonica*, and the Seville or bitter orange, *C. vulgaris*, are the commonly recognized species. All species abound in a volatile oil, which is used in medicine and the manufacture of perfumery.

Cit'y, a large town, especially one incorporated with special privileges. In the thirteenth century the word was applied in England to important boroughs, such as London and Leeds. Under the Norman kings the episcopal sees began to be removed to the chief borough or "city" of the diocese, as in France, and the term city came to be used specifically to designate a borough which was the seat of an episcopal see. In the reign of Henry VIII the boroughs in which new bishoprics were established were created "cities." This title has been generally conferred on nearly all places to which new bishoprics have been assigned in the nineteenth century; but a number of boroughs which are not episcopal sees have had it conferred upon them by royal authority. In Canada a city is a municipality of the highest class, and is separated from the jurisdiction of the county council. In the U. S. the term is specifically applied to municipalities which are governed by a mayor and board of aldermen, or other similar body, and in which there is no general deliberative assembly of the citizens, or "town council."

City Point, port of entry of Prince George Co., Va.; on the James River, at the mouth of the Appomattox, 10 m. ENE. of Petersburg. This point, being a good landing, was seized by the troops under Gen. Butler in his movement up the James, May, 1864, and in June became the headquarters of Grant after his passage of this river; during his later operations against Petersburg and Richmond was the depot of supplies for his army.

Ciudad Bolivar (thē-ō-dăd' bōl-ē-vär'), formerly ANGOSTURA; a town of Venezuela; largest in the state of Bolivar; on the right bank of the Orinoco; 240 m. from its mouth. It is situated near a pass or narrows of the river, hence the last name. It can be reached by vessels of 300 tons, and considerable trade is carried on here, chiefly in cocoa, sugar, cotton, jerked meat, hides, and a medicinal bark called angostura. Pop. (1894) 11,686.

Ciudad Real (—rā-äl'), town of Spain; capital of province of same name; on a plain 5 m. S. of the Guadiana; has several fine churches, monasteries, large hospital founded by Cardinal Lorenzand; manufactures of linen and coarse woolen fabrics, and an annual mule fair. This town was the headquarters of the Hermandàd, or Holy Brotherhood, founded, 1249, for the suppression of robbery. Pop. (1900) 15,327.

Ciudad Rodrigo (—rōd-rā'gō), fortified town of Spain; on the river Agueda; 90 m. SW. of Salamanca; has a Gothic cathedral founded in the twelfth century, and a citadel. During the Peninsular War it was important as a key of Spain on the W.; was invested and taken by Massena, July, 1810. The army of Wellington assaulted and took it with 150 guns, January, 1812, for which achievement the Spanish Govt. gave him the title of Duke of Ciudad Rodrigo. Pop. (1900) 8,007.

Civet (sĭv'ĕt), a pale yellow or brownish substance, of a strong, offensive odor, used in perfumery, because when mixed in small proportions with other perfumes it improves them greatly; is secreted by the anal glands of a carnivorous animal called the civet or civet cat, which ranks between the weasels and the foxes; comes mostly from N. Africa and S. Asia.

Civ'il Death, the cessation or loss of one's civil rights and capacities so that he becomes, as it were, dead in law while the physical life remains; or the state of a person who is separated from civil society and has lost his civil rights. In some of the U. S., as in New York, the sentence of a criminal to imprisonment for life causes civil death and nullifies an existing marriage.

Civil Law. See LAW.

Civil Serv'ice and Civil Serv'ice Reform'. In its comprehensive sense, the civil service of a nation, state, or city embraces the whole body of officers who manage the civil affairs of its government. Men placed in such office are apt to feel it a duty, and a matter of safety, to work for their benefactors. From such a view of the matter the step was but a short one to the practice of collecting political assessments upon salaries. This system has long been known as the "spoils system." But little

developed before Jackson's time, that system first found a distinguished apologist in Senator Marcy, of New York, who, in a speech in the Senate in 1832, said, especially of New York politicians, "*They see nothing wrong in the rule that to the victor belong the spoils of the enemy.*" In that state a spoils system began to appear early in the nineteenth century. Thence it spread to the Federal Government during Jackson's administration. During the first forty years of constitutional government in the U. S. the general feeling was that to remove from office, except for cause, was a tyrannic outrage.

Between 1872 and 1874 Pres. Grant enforced a system of competitive examinations in the departments at Washington, and he appointed a civil-service commission to take charge of them. But Congress in 1874 and 1875 refused all appropriations. Competitive examinations, as a consequence, were suspended, and the old pass examinations were renewed; Congressional patronage again flourished. Competitive examinations were, however, established by Pres. Hayes at the post office and the customhouse at New York City, and they were continued there by Pres. Garfield and Arthur. Under the Act of January 16, 1883, Pres. Arthur appointed a civil-service commission and approved a series of civil-service rules. Since July 16, 1883, these rules have been enforced, and all places in that part of the civil service to which the act and the rules extend have been filled by competitive examination.

The first step toward civil-service reform in Great Britain was the introduction, in 1855, of the "pass examinations," followed by the competitive examinations. In 1870 these examinations were made general for home as well as foreign offices.

Civiliza'tion, in popular use, a word with twofold meaning; sometimes employed to describe a process and sometimes a condition. As a process, the act of elevating or developing from a savage or semibarbarous state to a state of intelligence, order, and refinement. As a condition; the state of a people with whom intelligence is cultivated, manners are refined, industries are active, and arts are prosperous. In the first sense it aims at, and in the second it consists of, a highly and harmoniously developed condition of the individual man and of a state of society that is conducive to the most favorable relations of the individual man with his fellowman.

Civ'il War in Amer'ica, a struggle which lasted for four years (1861–65) between the N. and S. states of the Union. Its principal cause was the continuance of the institution of slavery by the S. states long after it had been abolished in the North. The difference in economic conditions in the two sections of the country led to political differences and the South came to stand for the principle of state's rights. The presidential election of 1860 turned to a great extent upon the slavery and state's rights questions, and when Abraham Lincoln, the Republican candidate, was elected the slaveholding states considered themselves defeated, and S. Carolina, Mississippi, Florida, Alabama, Georgia, Louisiana, and Texas formally seceded from the Union. These states formed themselves into a S. Confederation (February 4, 1861), with Jefferson Davis as president, and they were subsequently joined, after hostilities had begun, by Virginia, N. Carolina, Tennessee, and Arkansas. The customhouses, arsenals, and U. S. buildings generally were seized and occupied by the Confederates in their own states, and every preparation made to organize a separate government. War was inevitable, and the first blow was struck on April 12, 1861, the Confederates proceeding to bombard Fort Sumter, which was forced to surrender. President Lincoln then called out by proclamation 75,000 volunteers, and the first battle on a large scale took place at Bull Run, S. of Washington, where the Federal forces were completely defeated. During the remainder of 1861 frequent collisions took place, almost always to the disadvantage of the North. In the spring of 1862 Gen. Grant, for the Federals, captured Fort Donelson, on the Cumberland River, and along with Gen. Sherman obtained a victory over the Confederates at Pittsburg Landing, in Tennessee. In April the Federal fleet, under Admiral Farragut, ran past the forts at the entrance of the Mississippi, and seized New Orleans, which was occupied by the supporting land forces. An attempt was then made by Gen. McClellan to invest Richmond, the capital of the Confederacy, but this was prevented by the Confederate generals Lee and "Stonewall" Jackson, who drove back the Federals on the James River, where they established themselves. Gen. Lee then assumed the offensive and moved with his whole army upon Washington, but he was intercepted on the banks of the Antietam by McClellan, and, after an obstinate fight, compelled to recross the Potomac. Soon afterwards McClellan was superseded by Burnside, and in December another advance to Richmond was commenced. This Gen. Lee had anticipated, and intrenched himself behind the town of Fredericksburg, a position from which the Federals vainly endeavored to dislodge him. Thus the year 1862 closed with no great gain on either side. In the following April Gen. Hooker, superseding Burnside in the command of the Army of the Potomac, commenced another movement toward Richmond, but was defeated by "Stonewall" Jackson at Chancellorsville, where, by mischance, the latter was killed in the darkness by his own men. Following up this gain Gen. Lee transferred his army to the Valley of the Shenandoah, entered Maryland, and crossed into Pennsylvania. At Gettysburg he was obliged to turn upon the pursuing Federal forces under Meade, and after three days' desperate fighting and the loss of 15,000 men, Lee was forced to retreat into Virginia. On the Mississippi the fortune was also in favor of the Federals. Aided by the fleet, which had dashed past Port Hudson and seized Natchez, Gen. Grant had assumed the offensive and captured Vicksburg, while at the end of this year (1863) he inflicted a severe defeat upon Bragg at Chattanooga. In 1864 Gen. Grant, as the result of his successes, was appointed Federal

commander in chief, and at once set himself to reorganize the Federal forces. He took command of the Army of the Potomac himself, with which he proposed to meet Lee, while he dispatched Sherman to operate against J. E. Johnston. In May Grant moved his main force across the Rapidan and immediately attacked Lee in the Wilderness, where severe fighting lasted for six consecutive days. Unable to rout the Confederates, Grant endeavored by a flank movement to cut them off from Richmond, but Lee anticipated the attempt and foiled it. Thus baffled, Grant by a circuit crossed the James River, joined Butler, and attacked Petersburg, but was repelled, and obliged to begin a regular siege during the winter. Meantime Sherman, with a large Federal force, had defeated Hood (who superseded Johnston as commander in Georgia), had occupied Atlanta, crossed the country by forced marches, seized Savannah, and by February, 1865, was able to occupy Charleston and Wilmington. During this brilliant movement the forces under Lee and Grant had faced each other in the lines round Richmond, and after a three days' conflict the city lay at the mercy of the N. armies. Lee retreated N. of the Appomattox, but was closely followed by Grant, who captured the general and his whole army. The remaining Confederate armies in the field soon afterwards surrendered, and the four years' war ended in favor of the Federal Government. In the course of the war the abolition of slavery had been proclaimed by Pres. Lincoln.

Civita Vecchia (chē'vē-tä vĕk'kē-ä), ancient *Centum Cellæ* and *Trajani Portus*, fortified seaport of Italy; 36 m. WNW. of Rome; is inclosed by walls and well built; has a large church, arsenal, theater, lighthouse, and a castle founded in the reign of Julius II. The harbor was constructed by Trajan, and is formed by two large moles, and a breakwater; was destroyed by the Saracens, 812, and rebuilt under Pope Leo IV on the return of its former inhabitants.

Claiborne (klā'bōrn), or **Clay'borne, William,** abt. 1589–1676; American colonial politician, "the champion of Virginia and the evil genius of Maryland"; b. Westmoreland, England; appointed by Charles I his Secretary of State for the dominion of Virginia, 1626, and treasurer for life, 1642; discovered, purchased, and planted Kent Island, 1631; island claimed by Maryland as part of its territory, 1634; long disputes and bloodshed followed; on execution of Charles I, headed commission to reduce Virginia and Maryland for proclaiming Charles II; established a Roundhead government with himself as Secretary of State, 1652, but Cromwell did not sustain him and restored the Calvert government.

Clairvaux (klăr-vō'), village in department of Aube, France; 10 m. above Bar-sur-Aube; on the Aube River; noteworthy as the site of the Cistercian abbey of Clara Vallis, founded, 1115, by St. Bernard, who was its abbot till his death, 1153, and who threw such a glory over the place that, 1143, the kingdom of Portugal extravagantly declared itself a fief of the abbey of Clairvaux; afterwards famous for the architectural merits of its church.

Clairvoy'ance. See HYPNOTISM.

Clam, a name applied to many bivalve mollusks of different genera. The common clam of the New England coast is *Mya arenaria*, ranging from S. Carolina to the Arctic Ocean. In the U. S. it is of considerable importance as an article of food, and is extensively used for bait. The Little Neck clam of New York is *Venus mercenaria*, known in New England as the quahaug or hard clam. The great clam of the NW. coast of America, *Lutraria maxima*, is a staple article of food for the coast tribes of Indians. *Glycimeris generosa*, the giant clam of the U. S. Pacific coast, attains a weight of 5 or 6 lbs., and lives in moderately deep water. The term giant clam is also applied to *Tridacna gigas*, the largest of bivalves, whose shells attain a weight of 250 lbs. each, and are sometimes used in Roman Catholic churches to contain the holy water. The various species of fresh-water mussels, or *Unios*, are popularly termed fresh-water clams in the U. S.

Clan, body of kindred larger than a household and smaller than a tribe, and recognizing relationship in only one line of descent—*i.e.*, either through the mother or through the father, but never through both. In English usage the word specifically means the kinship organization of the Scottish Highlanders. Corresponding terms in other languages are the Roman *gens*, the Greek *γένος*, the Arabic *hayy*, the Irish *sept*, and the N. American Indian *otem* (*totem*). In ethnology it has become necessary to have a general name for the organization wherever found, and "clan" has been adopted. The earliest type of the clan is the totem-kin, the best examples of which are found among the N. American Indians. The group of kindred takes its name from some actual object—as the hawk, turtle, or bear—from which the group is descended. Relationship is metronymic, *i.e.*, is traced only through mothers. A later form is patronymic, *i.e.*, relationship is traced only through fathers. A clan is essentially a juristic organization. Its members are under obligation to avenge one another's injuries. They have common rights and duties, among which marital rights and obligations are of the first importance. A man may not marry his clanswoman. Therefore no clan is self-perpetuating, and a tribe accordingly comprises two or more clans whose members intermarry. See TRIBE.

Clare, or Clar'a, Saint, 1193–1253; founder of the Nuns of St. Clare, the first order of Franciscan nuns; b. Assisi, Italy; organized the order, 1212, which received a rule of strictest character from Cardinal Hugolin, 1220, a relaxed one from St. Francis, 1224, and a much milder one from Urban IV, 1263. The Capuchin reformation in the Franciscan order led many of the sisters, under the guidance of Peter of Alcantara, to establish the Poor Clares of the Strictest Observance, who vow perpetual silence. The order is known also

as The Poor Clares, and their convents are for the most part occupied in the contemplative life.

Clar'endon, Constitu'tions of, laws made by a general council of the English barons and prelates at Clarendon, Wiltshire, 1164, whereby King Henry II checked the power of the Church, and narrowed the exemption which the clergy had claimed from secular jurisdiction. These ordinances, sixteen in number, defined the limits of the patronage and jurisdiction of the pope, and provided that the crown should be entitled to the election to vacant dignities in the Church. The most characteristic of all the stipulations—which most pointedly indicated the dawning new idea of the relation between State and Church—was that concerning the exemption of the clergy from the secular jurisdiction. It was agreed that in criminal cases the clergy should be amenable to the common courts, as ecclesiastical tribunals could not inflict death, so crime among the clergy increased and was unpunished. The constitutions were unanimously adopted, and reluctantly signed by the primate Becket, but rejected by Pope Alexander III, not because they sought to punish guilty clerics, but for their infringement on the rights of the Church in the collation of benefices. Most of their provisions, however, remained in force.

Clarendon, Edward Hyde (First Earl of), 1608–74; English statesman; b. Dinton, Wiltshire; studied law; entered Parliament, 1640; followed the court when civil war broke out, 1642; Chancellor of the Exchequer, 1643; chief adviser of Charles I during the war; accompanied the Prince of Wales in exile; Lord Chancellor of England, 1660–67; then impeached and banished by Parliament; died in Rouen, France; chief writings: "History of the Rebellion in England," 1707; "History of the Civil War in Ireland," 1721; and an autobiography, 1759. His works have the merit of a stately style, but are prejudiced and unreliable as history.

Clarendon, George William Frederick (Fourth Earl of), 1800–70; English statesman; b. London (Villiers family); minister to Spain, 1833–39, where he upheld Espartero's policy of constitutional government; Lord Privy Seal, 1840–41; as Lord Lieutenant of Ireland, 1847–52, showed moderation, tact, and energy; Secretary of Foreign Affairs, 1853–58; covering the period of the French Alliance and the Crimean War; again Foreign Secretary, 1865–66 and 1868–70; concluded with Reverdy Johnson a treaty concerning the "Alabama Claims," 1869, which was rejected by the U. S. Senate.

Claretie (klă-rĕ-tē'), **Jules Arnaud Arsène,** 1840– ; French author; b. Limoges; administrator of the Comédie Française, 1885; French Academy, 1888; his novels include "Pierrille," "Mlle. Cachemire," "The Assassin," "The Million," "Monsieur the Minister," "The American Woman"; historical works, "The Revolution of 1870–71," "Paris Besieged," "Five Years After: Alsace and Lorraine Since Annexation"; dramatic compositions related chiefly to the great revolution; also contributed many biographies to the series "Célébrités Contemporaines."

Clarinet (klăr'ĭ-nĕt), or **Clarionet',** a musical instrument, said to have been invented by Johann Denner, of Nuremberg, in 1690. It consists of a cylindrical tube, terminating in a bell, with holes in the side, half capable of being closed by the fingers and half by keys. The mouthpiece, which is provided with a single reed, is a conical stopper flattened on one side to form a table for the reed. The sounds of the instrument depend upon the vibration of the reed against the table. The fundamental scale consists of nineteen semitones, of which eighteen are produced by removing the fingers from the holes and lifting the keys, the lowest note being emitted through the bell. It cannot be played in more than one key.

Clark, Abraham, 1726–94; signer of the Declaration of Independence; b. Elizabeth, N. J.; member of the New Jersey Committee of Public Safety; delegate to the Continental Congress of 1776; reëlected six times to the Continental and twice to the Constitutional congresses; member of the Constitutional Convention of 1787.

Clark, Alvan, 1804–87; American lens maker; b. Ashfield, Mass.; when over forty years old his son George made a small reflecting telescope in which he became interested, and soon after gave up his art studio and engaged in making astronomical instruments with his sons at Cambridge; the first American who successfully made large achromatic lenses. In this department and in astronomical observation he won great fame. He invented a double eyepiece for measuring small arcs.

Clark, Alvan Graham, 1832–97; American astronomer; son of Alvan; b. Fall River, Mass.; partner with his father; received a Russian medal for the 30-in. refractor in the St. Petersburg Observatory; went with the solar eclipse expeditions of 1870, to Spain, and of 1878, to Wyoming; resolved difficult double stars, receiving from the French Academy of Sciences, the Lalande gold medal, 1862, for resolving the companion star of Sirius.

Clark, George Rogers, 1752–1818; American frontiersman; b. near Monticello, Va.; settled in Kentucky, 1775; procured the organization of Kentucky as a county of Virginia, 1776; appointed major of militia; captured Kaskaskia, Ill., from the French, 1778; compelled the capitulation of Vincennes, Ind., 1779; invaded the country of the Shawnees and burned their villages; ambuscaded a detachment of Benedict Arnold's army in Virginia, 1781; defended the settlements around Louisville, Ky., from Brant and his allies, 1782; was influential in preserving the country N. of the Ohio River to the U. S. in the peace of 1783.

Clark, William, 1770–1838; American military commander and explorer; b. Virginia;

brother of George Rogers Clark; removed to St. Louis, 1804; commander of the Lewis and Clark expedition (*q.v.*) to Oregon, 1804; brigadier general in Upper Louisiana; Governor of Missouri, 1813–21; superintendent of Indian affairs at St. Louis, 1822–38.

Clarke, Mary Cowden, 1809–98; English author; daughter of Vincent Novello, composer; b. London; was married, 1828, to Charles Cowden Clarke, author; best-known works, "The Complete Concordance of Shakespeare" and "World-noted Women."

Clarke Riv'er, or **Flat'head Riv'er,** rises in the Rocky Mountains in W. Montana; flows NW., traverses N. Idaho, and enters Washington. Near the N. boundary of Washington it enters the Columbia River; length about 650 m.

Clark'son, Thomas, 1760–1846; English philanthropist; b. Wisbeach, Me.; an associate of William Dillwyn and other members of the Society of Friends, who had formed themselves into an antislavery committee. Mr. Wilberforce coöperated, and was the chief advocate of the cause in Parliament. Clarkson diligently collected and diffused information about the slave trade. Their efforts excited violent opposition, and were several times defeated in Parliament, but finally an act to abolish the slave trade was passed, 1807. He published, 1808, "The History of the Abolition of the Slave Trade"; in 1823 was president of the Antislavery Society and devoted himself to the extirpation of slavery in the W. Indies, which was accomplished, 1833.

Class'ic, or **Class'ical,** pure, refined; conformed to the most perfect standard; also pertaining to the ancient Greek or Latin authors, or famous by association with ancient writers, as "classic ground." The ancient Romans were divided into six classes, and those of the first or highest class were called *classici*. Hence the term came to signify the purest class of writers in any language, though formerly it was applied only to the most esteemed Greek and Latin authors. The epithet "Classical," as applied to ancient writers, is determined less by purity of style than by the period at which they wrote. The classical age of Greek literature begins with Homer, and extends perhaps to the time of the Roman emperor, Antonine, but signs of decadence appeared abt. 300 B.C. The Latin classical period is shorter; its earliest writer is Plautus, and it ended abt. 200 A.D. Some critics, however, include Claudian, who was born abt. 365 A.D., among the classics.

Class'is, in the Reformed churches in the U. S. and in Holland, a church court corresponding to the Presbytery in Presbyterian churches; composed of elders delegated by the consistories (the governing body of each church), one from each, of the pastors and all the ministers in a certain district.

Claude Lorrain (klawd lōr-răñ'). See GELÉE, CLAUDE.

Claudianus (klâ-dĭ-ā'nŭs) **Claudius,** d. abt. 408; Latin epic poet, birthplace unknown, who went to Rome from Alexandria, 395 A.D. and gained the favor of Stilicho. His poems were so popular that a statue was erected to him in Rome by the senate and the emperor. Among his works are "The Rape of Proserpine," "The Battle of the Giants," and a "Eulogy of Stilicho" (De Consulatu Stilichonis). He is regarded as the last of the classical Latin poets.

Clau'dius, or, more fully, TIBERIUS CLAUDIUS DRUSUS NERO, 10 B.C.–54 A.D.; fourth emperor of Rome; b. Lugdunum (Lyons); a son of Drusus Nero and nephew of Emperor Tiberius; on the death of Caligula, his nephew, was proclaimed emperor by the army, 41 A.D., and unwillingly recognized by the senate, who preferred a republic; put to death his wife, the infamous Messalina; her successor, his niece, Agrippina, was even worse. Claudius built a great aqueduct called Aqua Claudia, and successfully invaded Britain in person; was poisoned by Agrippina.

Clau'dius, Appius, surnamed CRASSUS; Roman patrician; decemvir, 451 B.C.; rendered himself infamous by an attempt to enslave and dishonor Virginia, whom he claimed the right to retain as the slave of one of his clients. Her father, unable to obtain redress from the courts, slew her and appealed to the army. A popular revolt expelled the decemviri, and Claudius was seized and imprisoned. According to Livy, he committed suicide.

Claudius, Appius Cæcus, Roman patrician, censor abt. 312 B.C., and consul, 306 and 295; constructed the great road, Via Appia, from Rome to Capua, and built the first great aqueduct which brought water from Tusculum to the city.

Claudius, Marcus Aurelius, surnamed GOTHICUS, 214–70; Emperor of Rome; b. Illyricum; proclaimed emperor by the army on the death of Gallienus, 268 A.D., and their choice as ratified by the senate; defeated the rebel Aureolus, 268, and gained a victory over the Goths or Scythians in Servia, 269; succeeded by Aurelian.

Clav'icle, or **Col'lar-bone,** bone which, with the scapula and the head of the humerus, forms the shoulder. In man it is horizontal and immediately above the first rib. Its office is to keep the shoulders apart, and to afford a fulcrum by which the muscles give lateral movement to the arm. Clavicles are absent in those mammals in which the fore limbs are used only for walking or swimming; they are commonly present in mammals which use the fore limbs for climbing, digging, or flying. Among carnivores the clavicles are absent or rudimentary, being largest in the cat family. In birds the clavicles are usually united with a third bone, the interclavicle, to form the furcula, or wishbone.

Clay, Henry, 1777–1852; American statesman; b. Hanover Co., Va., son of a Baptist preacher; studied law in Richmond; admitted to the bar, 1797; removed to Lexington, Ky., to practice; elected to state legislature, 1803, and strove unsuccessfully to have a clause inserted in the revised state constitution pro-

viding for the gradual abolition of slavery; U. S. Senator to fill vacancy, 1806–7; again in State Legislature, 1808–9; and Speaker in last year; again U. S. Senator to fill vacancy, 1810–11; Representative in Congress and Speaker, 1811–14; commissioner to negotiate peace with Great Britain, 1814; reëlected to Congress and Speaker, 1815–20 and 1823–25; a champion of protection to home industry and of national improvements; foremost in supporting the Missouri Compromise; Secretary of State, 1825–29; U. S. Senator, 1831–42; defeated as the Whig candidate for President by Jackson, 1832, and by Polk, 1844; again U. S. Senator from 1849 till his death; last great work, the Compromise of 1850.

Clay, any fine-grained earth which is sticky when wet and coherent when dry. Clays differ widely in composition, but silica is usually the chief ingredient and alumina stands second. Minor components are water, iron oxide, lime, magnesia, and alkalis. Classed as to origin, clays are (1) sedimentary, the finest sediments deposited by water; (2) residual, the material left after the removal by percolating water of the soluble parts of rocks, especially limestones; (3) glacial, the fine rock flour ground up by glaciers and deposited in till; are also named, according to their uses, as pottery, slip, porcelain, terra cotta, brick, and fire clay. Clays occur in all of the U. S., being so abundant that their importance is rarely appreciated. The various products of clay in the U. S., 1905, had a value of $142,535,057; including brick, tile, sewer pipe, terra-cotta work, and pottery.

Clay'more, sometimes spelled GLAYMORE, a heavy two-handed sword used by the Highlanders of Scotland. It had a crossguard with curved guillons. The name was also given in the eighteenth century to a basket-hilted broadsword.

Clay'ton, John Middleton, 1796–1856; American statesman; b. Dagsboro, Del.; early gained high reputation at the bar; served in state legislature and as Secretary of State; U. S. Senator, 1829–36, 1845–49, and from 1853 till his death; Chief Justice of Delaware, 1837–39; U. S. Secretary of State, 1849–50; negotiated with Sir Henry Bulwer, British minister at Washington, the treaty bearing their joint names, providing for the construction of an isthmian canal, 1850.

Clayton-Bul'wer Trea'ty, treaty concluded between Great Britain and the U. S.; signed in Washington April 19, 1850; related to the establishment of a communication between the Atlantic and Pacific oceans by a ship canal across the Isthmus of Panama, and consisted of nine articles, the contracting parties declaring that they would not erect fortifications on the banks or in the vicinity of the proposed canal; that they would not assume dominion over Nicaragua, Costa Rica, the Mosquito coast, or any part of Central America. Opposite and contradictory constructions having been placed upon this treaty by both governments, another, the Dallas-Clarendon Treaty, was signed in London, October 17, 1856, but was ultimately rejected. The commencement of the Panama and the Nicaragua ship canals again brought the Clayton-Bulwer Treaty into discussion, a protest being made by Great Britain, but all further possibility of dispute was cleared away through the abrogation of this treaty by the ratification of the Hay-Pauncefote Canal Treaty, December 16, 1901.

Cleanthes (klē-ăn'thēz), Stoic philosopher; native of Assos, Asia Minor; a disciple of Zeno, whom he succeeded as head of the Stoic school, 260 B.C.; author of a much-admired hymn to Zeus.

Clear'ing House, institution organized by persons or corporations engaged in some department of trade or finance for convenience in settling accounts and effecting exchanges. The clearing-house system was first established in London about the beginning of the nineteenth century. The three great clearing houses of London are the Bankers' Clearing House, the Stock Exchange Clearing House, and the Railway Clearing House. The system was introduced into the U. S. by the banks of the city of New York, which established the New York Clearing House by organizing an association and commencing operations, October 11, 1853. The exchanges at all U. S. clearing houses in year ending September 30, 1908, aggregated $126,238,694,398. New York led with $73,630,971,913; followed by Chicago, $11,425,304,804; Boston, $7,096,412,351; Philadelphia, $6,528,291,691; St. Louis, Pittsburgh, San Francisco, Baltimore, Cincinnati, and Kansas City, each over the $1,000,000,000 mark. See BANK.

Cleaveland (klēv'lănd), **Moses**, 1754-1806; American pioneer; b. Canterbury, Conn.; became a lawyer, but was also a captain of sappers and miners during the closing years of the Revolution; one of a company which purchased for $1,200,000 from Connecticut the land in Ohio reserved to the state by Congress and known as the W. Reserve; in 1796 led a party of surveyors and pioneers to the present site of Cleveland, laid it out, and his companions named it for him. The name of the city was abbreviated to its present form in 1830, by the publisher of the first newspaper there, who needed room in his headline.

Clef, character placed on the musical staff, by which the names of the notes are fixed. There are three clefs—*viz.*, the G or treble clef (on the second line); the F or bass clef (on the fourth line); and the C clef, which is placed on the fourth line for the tenor, and on the third line for the alto. The C clef was also formerly used for the soprano voice. It was written on the first line of the staff. The G and F clefs are now in most general use, both in vocal and instrumental music. And though a tenor part with the G clef is really an octave out of place, yet this is understood by the singer.

Clem'atis, a genus of about 100 species of herbaceous or soft wooded, mostly climbing plants, of the family *Ranunculaceæ*, found in the temperate regions. Species native to N. America are *Clematis virginiana* E. of the Rocky Mountains, and *C. ligusticifolia*, from the Great Plains westward, both high climbers

with profuse foliage and numerous, large clusters of white flowers. These are adapted for covering arbors, trellises, screens, etc., and are called "virgin's bower." Two European species, *C. flammula* and *C. vitalba*, are also much grown. The single-flowered species have been greatly enlarged and modified by cultivation, especially the *C. florida* from Japan, *C. lanuginosa* from China.

Clemenceau (klā-mŏn-sō'), **Eugène Georges,** 1841– ; French statesman; b. Mouilleron-en-Pareds; graduated in medicine, 1869; elected to National Assembly, 1871, but soon resigned; President of the Paris Municipal Council, 1875; elected to National Assembly, 1877; acknowledged leader of the Radical Republican Party; member of committee to direct resistance against the antiparliamentary party; lost reëlection, 1893; out of political office till 1903, when he was elected to the senate; Minister of the Interior, 1906, and formed new Cabinet and took post of Premier later in same year; frequently called the "king maker." He resigned his office in July, 1909.

Clemens (klĕm'ĕnz), **Samuel Langhorne** (MARK TWAIN), 1835– ; American humorist; b. Florida, Mo.; worked as a printer, then as a Mississippi pilot; journalist in Virginia City, Nev., 1862; later followed the same profession in San Francisco and Buffalo, N. Y.; afterwards resided in Hartford, Conn., New York, etc.; in 1863 adopted his *nom de plume*, formerly used by Capt. Isaiah Sellers, a contributor of river news to the New Orleans *Picayune*; founded in New York, 1884, the publishing house of C. L. Webster & Co., which failed disastrously; made a lecturing tour of the world, and thereby paid every dollar of indebtedness; works include "The Jumping Frog," "The Innocents Abroad," "Roughing It," "Adventures of Tom Sawyer," "A Tramp Abroad," "The Stolen White Elephant," "The Prince and the Pauper," "Life on the Mississippi," "Huckleberry Finn," "A Yankee at King Arthur's Court," "Joan of Arc," "Merry Tales," "The Man that Corrupted Hadleyburg," "Christian Science," and with C. D. Warner, a novel, "The Gilded Age."

Cle'mens Roma'nus. See CLEMENT I.

Clem'ent of Alexandria, b. abt. 150 A.D.; one of the Fathers of the Christian Church; supposed native of Athens, and originally a pagan; passed the greater part of his life at Alexandria, where he became a disciple of Pantænus, a Christian philosopher, and his successor as head of the famous catechetical school; was ordained a presbyter, and, 202 A.D., retired to Palestine to escape persecution; was more addicted to speculative philosophy than most of the Fathers of the Church. Among his extant works (written in Greek) are "Pædagogus" and "Stromata."

Clement I. (CLEMENS ROMANUS), abt. 30-100 A.D.; pope; one of the Apostolic Fathers; succeeded Anacletus, 91; accounted a saint and martyr; his festival day is November 23d.

Clement XIV. (GIOVANNI VINCENZO ANTONIO GANGANELLI), 1705–74; pope; b. St. Arcangelo; succeeded Clement XIII, 1769; undertook conciliation of courts offended by his predecessor; decreed suppression of the Jesuits, 1773; recovered Avignon, Benevento, and other places lost by predecessor; Clementine Museum remains a monument of his munificence and love of art; succeeded by Pius VI.

Clementi (klā-mĕn'tē), **Muzio,** 1752-1832; Italian pianist and composer; b. Rome; removed to England abt. 1765; at eighteen he composed his Opus II, regarded as the basis on which the whole fabric of modern sonatas for the piano has been founded; composed many sonatas and wrote the "Gradus ad Parnassum," a series of one hundred piano studies, a master work upon which modern piano technic has been built.

Clem'entines, name given to two writings, the "Homilies" and the "Recognitions," falsely ascribed to Clement of Rome. They originated in Rome about the middle of the second century. The name Clementines is also applied to that part of the canon law which was collected and published by Pope Clement V, 1305–14.

Cleombrotus (klē-ŏm'brō-tŭs) Spartan general; brother of Leonidas, who fell at Thermopylæ; commanded the army, 480 B.C., after the death of Leonidas; was the father of Pausanias, who defeated the Persians at Platæa.

Cleombrotus I. d. 371 B.C.; king of Sparta; grandson of the preceding; began to reign, 380 B.C.; commanded the Spartans at Leuctra, where he was defeated by Epaminondas and killed.

Cleomenes (klē-ŏm'ē-nēz), or **Kleom'enes,** d. 489 B.C.; king of Sparta; succeeded his father, Anaxandrides, abt. 518 B.C.; liberated Athens from the domination of the Pisistratidæ, 510, but afterwards attempted to restore Hippias; procured the dethronement of Demaratus, who had reigned jointly with himself; succeeded by his half brother, the heroic Leonidas.

Cleomenes III, d. 220 B.C.; King of Sparta; son of Leonidas II; began to reign, 236 B.C.; declared war against the Achæan League, and defeated Aratus at Megalopolis, 226 B.C.; put to death all the ephori except Agesilaus, who escaped; made a new division of land, and restored the old social system; was defeated at Sellasia, 222, by Antigonus, king of Macedon, an ally of the Achæans; fled to Egypt, and killed himself.

Cle'on, d. 422 B.C.; Athenian demagogue distinguished for insolence and venality; first mentioned in history abt. 428; was a leader of the democracy or lower classes; with Demosthenes conducted a successful expedition against Sphacteria, 425; commanded an army sent against the Spartan general, Brasidas, 422. Cleon and Brasidas were both killed in the battle of Amphipolis, where the Athenians were defeated. His character is depicted with great exaggeration by Aristophanes and even Thucydides is hardly just to him.

Cleopatra (klē-ō-pā'trā), 69–30 B.C.; queen of Egypt; daughter of Ptolemy Auletes; distinguished for her personal charms and mental

gifts. Her father dying, 51, left the throne to her in partnership with her brother Ptolemy. The latter deprived her of her royal power, but Julius Cæsar interposed, 48, and restored her to the throne after Ptolemy had been killed in battle. She captivated Cæsar, accompanied him to Rome, 46, and bore him a son known as Cæsarion. After his death, 44, she returned to Egypt. Soon after the battle of Philippi, 42, she was summoned by Antony to appear before him in Cilicia, and sailed up the Cydnus. He was fascinated by her and spent much time with her in Alexandria. Her fleet fought against Augustus at Actium, 31 B.C., she being present. She was the first to order a retreat, and was taken prisoner by Augustus, who intended to exhibit her in a triumphal procession in Rome. That she killed herself by the poison of an asp is now considered improbable.

Cleopatra's Nee'dles, obelisks of red granite which formerly stood in front of the temple of Cæsar at Alexandria in Egypt. One now stands on the Thames Embankment, London, having been erected there, 1878. The other, now in Central Park, New York; was first erected, abt. 1600 B.C., at Heliopolis, near the delta of the Nile, by Thothmes III, a famous Egyptian monarch, to commemorate his power. It is covered with hieroglyphics, was dedicated to the god, Ra, or the Sun, and stood before the Temple of Tun in Heliopolis till removed to Alexandria, Egypt, and set up there 23 B.C., where it remained till it was transported to New York, 1880, having been presented to the U. S. by Ishmail Pasha, Khedive of Egypt. These obelisks bear their popular name, "Cleopatra's Needles," on account of a false tradition that they were brought to Alexandria in the time of Cleopatra. The one in New York is 69½ ft. high, exclusive of the pedestal; weighs 196 tons, and is all in one piece.

Clepsydra (klĕp'sĭ-drä), an instrument used by the Greeks and Romans for measuring time by the gradual flow of water through one or more orifices. In its simplest form it was a vessel of known capacity, from which the water escaped through several holes in the bottom. To remedy the defect of the gradually decreasing rate of flow, another kind was used, in which the water was maintained at a constant level, the time being measured by the amount of water that was discharged.

Clerc (klâr), **Laurent,** 1785–1869; French deaf-mute; b. near Lyons; became a teacher of deaf-mutes under Abbé Sicard in Paris; removed to the U. S., 1816, with Gallaudet, and was one of the founders of the Hartford Asylum for the Deaf and Dumb; a laborious and successful teacher of deaf-mutes.

Clermont-Ferrand (klĕr-mōñ'-fā-rāñ'), city of France; capital of department of Puy-de-Dôme; 208 m. S. by E. from Paris; occupies the site of the ancient capital of the Arverni, originally called *Nemosus,* and afterwards *Augustonementum*; became a bishop's see abt. 250 A.D. The great council in which the crusades originated was held here by Pope Urban II, 1095. Clermont was the capital of Auvergne for several centuries. Pop. (1901) 52,933.

Cleve'land, Grover, 1837–1908; twenty-second President of the U. S.; b. Caldwell, N. J.; son of Rev. Richard F. Cleveland, a Presbyterian minister; admitted to the bar, Buffalo, N. Y., 1859; assistant district attorney for Erie Co., 1863–66; member of the firm of Lanning, Cleveland & Folsom, 1869; sheriff of Erie Co., 1870–73; elected mayor of Buffalo, 1881, by the largest majority ever given in that city; by his vetoes saved the city nearly $1,000,000 in the first few months of his administration; as candidate for governor, 1882, received a plurality of 192,894 over his Republican opponent; as Democratic candidate for the presidency, 1884, received 219 electoral votes, his Republican opponent, James G. Blaine, 182; his popular vote, 4,874,986; Blaine's 4,851,981; on entering office announced that "no removals would take place except for cause"; made "offensive partisanship" a ground for removal from office; in 1885 removed about eighteen per cent of the postmasters and about eight per cent of the clerks in the departments in Washington; married, 1886, Frances Folsom, daughter of his former law partner; during the session of Congress ending August 5, 1886, vetoed 115 out of 987 bills which passed both Houses; advocated the speedy establishment of free trade; renominated, 1888; carried all the S. states, New Jersey, and Connecticut; received 168 electoral votes, Benjamin Harrison 233; popular vote for Cleveland, 5,540,329, Harrison 5,439,853; practiced law in New York, 1889–93; reëlected President, 1892, receiving 276 electoral votes to Harrison's 145, and Weaver's (People's Party) 23; Cleveland's popular vote 5,553,142, Harrison's 5,186,931, Weaver's 1,030,128; on his retirement settled in Princeton, N. J.; withheld support from the Democratic ticket, 1896, disbelieving in the free coinage of silver; elected trustee of the Equitable Life Assurance Society, 1905; served as rebate referee for the Equitable, Mutual, and New York Life insurance companies of New York, 1906; chairman Association of Life Insurance Presidents, 1907; published "Presidential Problems," 1904, and numerous contributions to periodical literature.

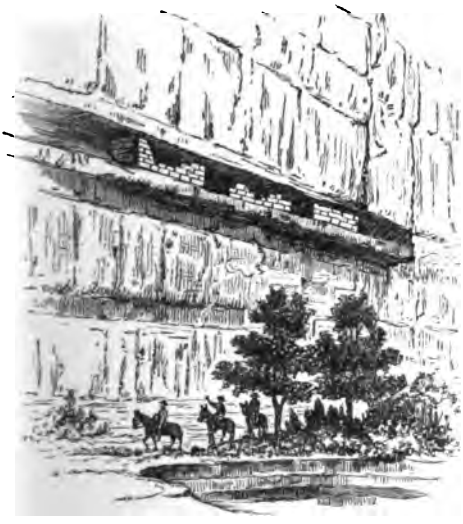
Cleveland, capital Cuyahoga Co., Ohio; on both sides of the Cuyahoga, where it flows into Lake Erie; 138 m. by rail NE. from Columbus. The site is a plateau, sloping gently from the high bank of the lake to an elevation of 50 to 150 ft. A score of bridges span the Cuyahoga within the city limits, and three great viaducts, crossing the valley at an elevation, unite the E., W. and S. divisions of the city. The Cuyahoga River was the original harbor, and it still affords space, within the city, for 16 m. of lateral docks. In the lake the U. S. Govt. has enclosed 400 acres within a breakwater. Cleveland is conspicuous for the width of its streets, of which almost all are lined with shade trees, and has won the name of "Forest City."

The educational institutions include: Western Reserve Univ.; Adelbert College, a college for women, having schools of medicine, music,

law, and dentistry; Cleveland Medical College; Case School of Applied Science; the medical department of Wesleyan Univ. and a homœopathic college. Six trunk lines and several smaller railways enter the city and passenger steamers run to various points on the Great Lakes. The Lake commerce is large. In the building of iron and steel vessels Cleveland surpasses all Lake ports. It is favorably situated for receiving and distributing the coal and petroleum from Ohio and W. Pennsylvania, and the mineral and lumber products from the upper Great Lakes.

Cleveland has large iron and steel works, foundries and machine shops, slaughter and packing houses, bridge works, petroleum refineries, electrical apparatus and supply works, and manufactures of clothing and malt liquor. It is the center of the U. S. malleable iron trade. The number of factories (1905) was 1,617; capital, $156,509,252; value of products, $172,115,101. A town site on the E. side of the mouth of the Cuyahoga was laid out, 1796, by Gen. Moses Cleaveland. In 1810 there were but fifty-seven persons in the hamlet; the village was incorporated, 1814; became a city, 1836; Ohio City on the W. side of the river was united with Cleveland, 1854; additions of several suburbs have further increased the area. Pop. (1906) 460,327.

Cliff Dwell'ings, domiciles built in natural recesses in the cliffs in the valleys of the Rio Grande and the Rio Colorado, especially on some of the E. tributaries of the latter stream; probably the work of the ancestors of the Pueblo Indians of the region to-day, though



CLIFF DWELLINGS ON THE SAN JUAN, UTAH.

the remarkable diversity of remains suggests a complexity of peoples and cultures, and a succession of periods of occupation has been assumed. The walls are of stone laid in mortar made of adobe clay. In some cases the stone is broken into somewhat uniform blocks, rudely dressed on the exterior surface. The interiors of the houses are often plastered. Many of the houses are small and occur singly, occupying niches or shelves in the cliffs, but when the recesses are large the plan is often expanded, and the structure becomes a communal dwelling or village of many rooms irregularly arranged to fill the spaces, and with exterior walls conforming to the irregular margin of the precipice. Two and even three stories are not unusual. It is not uncommon to see communal dwellings, round towers, cliff houses of masonry, and excavated bluff dwellings all in a single group, all connected, and grading in their features of construction one into the other. Cliff and cave dwellings are not known to have been occupied extensively in recent times, but limited occupation has been recorded, as well-preserved pottery, fabrics, tools, weapons, etc., show. See CAVE DWELLERS.

Climac'teric Year, name given, especially in former times and in astrology, to the years in which a critical change is supposed to take place in the human constitution of fortunes. These were the years ending the third, fifth, seventh, and ninth period of seven years, the grand climacteric or most critical time of human life being supposed to be the sixty-third year. Some added the eighty-first year. The mystical character of the number seven probably gave rise to this belief. There is an actual climacteric period in the lives of women, which usually occurs between the forty-fifth and fiftieth years, popularly known as the change of life.

Cli'mate, the permanent or average state of any locality with regard to atmospheric conditions such as temperature, moisture, winds, cloudiness, and precipitation; distinguished from *weather*, which regards only conditions that may obtain momentarily. There may be days of sunny *weather* in a foggy *climate*, or rainy *weather* in a dry *climate*. *Climatology*, or the science of climate, is a branch of meteorology, which includes also the science of the weather. The fundamental phenomenon of climate is atmospheric temperature, for its differences give rise to winds, and the direction of these, together with temperature variations, control precipitation. The temperature of the air is due both to the sun and to the earth's internal heat, but the latter may be disregarded for practical purposes. The distribution of heat over the earth's surface depends partly on astronomical causes, such as the earth's spherical form and the inclination of its axis, which cause the poles to have a cold climate while that of the equator is hot, with varying temperature between, and partly on physical causes such as the presence of land or water, direction and force of the winds, and elevation above the sea level. Not only is there a drop of one degree of average temperature for every rise of three hundred feet, but mountain ranges affect both temperature and rainfall in adjacent lowlands by deflecting air currents. Causes like these modify "astronomical climate" greatly, so that, for instance, Labrador is cold and treeless, while the British Isles, in the same latitude, are mild and fer-

tile. New York and Naples, San Francisco and Washington, are subject to the same astronomical conditions of climate; their actual differences are due wholly to physical causes.

The five so-called climatic zones—N. and S. frigid, N. and S. temperate, and torrid, are determined wholly by astronomical lines, the Tropics of Cancer and Capricorn inclosing the torrid zone at 23½° N. and S. of the equator, and the Arctic and Antarctic circles or N. and S. polar circles bounding the frigid zones at 23½° from the poles. The temperate zones, which lie between the torrid and frigid zones, are thus each 48° wide. The positions of these boundary lines were so chosen because the portion of the earth between the two tropics is that over which the sun, at some time during the year, stands vertically, and the polar circles mark the limits of the polar areas in which the winter sun does not rise daily. These lines are fixed, owing to the uniform inclination of the earth's axis to the plane of its orbit. Within these zones the distribution of land and water is very uneven. Water, owing to its high specific heat, has an equalizing tendency on climate, which is extended to adjacent land by the wind; hence the difference between an *insular* and a *continental* climate. The preponderance of land in the N. hemisphere makes its seasons more marked, and the earth's average surface temperature is thus higher during the N. than during the S. summer. On climatological maps the data of air pressure and temperature are usually reduced to what they would be at the level of the sea, thus eliminating the irregularities of the earth's surface. When the data thus corrected have been entered on maps, lines are drawn through the places having the same temperature, and these are called *isotherms*, while those through the same pressures are called *isobars*. See METEOROLOGY; WEATHER.

Cli'max, in rhetoric, a figure by which several propositions or objects are presented in such an order that the proposition or object adapted to produce the least impression shall strike the mind first, and the others rise by successive gradations of impressiveness. As in Cicero: "It is an outrage to bind a Roman citizen; to scourge him is an atrocious crime; to put him to death is almost a parricide; but to crucify him—what shall I call it?" A sentence in which the order is reversed is called an anticlimax.

Climb'ing Plants, Climb'ers, or **Creep'ers,** those plants which support themselves upon rocks, walls, buildings, other plants, etc. They have weak stems which are unable to bear the weight of their foliage and fruit, and they trail upon the ground unless they find some support. The morning-glory twines its stems tightly around suitable objects; the ivy sends out its innumerable roots from its stem, and these insinuate themselves into cracks and crevices. The vine twines certain special branches (tendrils) about the twigs of other plants, the clematis uses its leaf stalks for the same purpose. Some plants use their spiny leaves and smaller branches for lifting themselves, the spines catching upon the swaying branches. Darwin has pointed out that the free ends of many climbing plants, as in the morning-glory, are continually moving about



VIRGINIA CREEPER, A TYPICAL CLIMBING PLANT.

with a swaying or somewhat circular movement (known as *nutation*), until they strike an object about which they may coil.

Clin'ton, De Witt, 1769–1828; American statesman; b. Deer Park, N. Y.; son of Gen. James Clinton and nephew of George Clinton. He was admitted to the bar, 1788, but practiced very little, preferring to take part in politics as an active Republican or Antifederalist; was chosen to the State Legislature, 1797; member of State Senate, 1798–1802; appointed Mayor of New York City, 1802. He continued mayor until 1815, with the exception of the years from 1807–11. During this time he was also State Senator, 1805–11, and lieutenant governor, 1811–13; was nominated for the presidency, 1812, by those who opposed the war with Great Britain; received eighty-nine electoral votes. While Mayor of New York he did much to advance the interests of the city; established schools; ameliorated criminal laws; encouraged correction of vice and development of agriculture. He was elected governor of the state in 1817, and immediately set about the construction of the Erie Canal, which had long been one of his cherished schemes; continued governor until 1823, and was again elected in 1826. In October, 1825, the Erie Canal was opened, and Clinton lived to inaugurate several branches of it. He also influenced the development of canal systems in other states.

Clinton, George, 1739–1812; fourth Vice President of the U. S.; b. Little Britain, N. Y.; son of Charles, who emigrated from Ireland; practiced law, and was elected, 1775, to the Continental Congress, in which he did not vote for the Declaration of Independence, considering himself without authority to do so; with his brother James fruitlessly defended forts Clinton and Montgomery; Governor of New York, 1775–95; as governor defended the Mohawk Valley against the Indians under Johnson and Brant, and the Hudson Valley against Sir Henry Clinton; marched to suppress Shays's rebellion in Berkshire Co., Mass.; in 1788, presided over the state convention to ratify the Federal Constitution, which he disapproved, because it gave too much power to the central government; was afterwards the principal leader of the Republican Party in the

State of New York, and was chosen governor, 1801; received fifty electoral votes, 1792, and seven, 1796, for Vice President of the U. S., and, 1808, six such votes for the presidency; in 1804 was elected Vice President by the Democrats, with Jefferson as President; and was reëlected, 1808, in which position his casting vote, 1811, defeated the rechartering of the U. S. Bank.

Clinton, Sir Henry, 1738–95; English military officer; son of Admiral George, a colonial governor of New York; served in the Seven Years' War, and as major general at Bunker Hill, 1775; led an expedition, 1776, to N. Carolina, but it did not land, owing to the failure of the fleet to coöperate; driven, 1776, from Fort Moultrie, Charleston harbor; served under Howe from Long Island to Philadelphia; left in command at New York, and failed to aid Burgoyne's expedition down the Hudson Valley; was commander of the British army in N. America, 1778; evacuated Philadelphia, June, 1778, and moved his army by land to New York, encountering disaster at Monmouth; quarreled with Cornwallis, neglecting to support his campaign into Virginia; conducted an expedition against Charleston, S. C., which he besieged and took, May 12, 1780, capturing Lincoln's army of 6,000 men; in October, 1781, sailed from New York with about 7,000 men to relieve Cornwallis, but the latter surrendered at Yorktown before arrival of Clinton; was superseded by Carleton, 1781; afterwards member of Parliament, and Governor of Gibraltar, where he died; wrote "Narrative of Campaign in 1781 in N. America."

Clinton, capital of Clinton Co., Iowa; on the Mississippi, 42 m. above Davenport. Pop. (1900) 22,698.

Clio (klī'ō), one of the nine Muses; daughter of Jupiter and Mnemosyne; presided over History and Epics; represented as holding in



CLIO.
From an Antique Representation.

one hand a half-opened roll or scroll, and in the other a cithara; sometimes portrayed sitting, often with an open chest of books beside her.

Clisthenes (klīs'thē-nēs), Athenian statesman; granduncle of Pericles; lived abt. 500 B.C.; took part in the expulsion of the Pisistratidæ; increased the number of the tribes of Attica from four to ten, and made changes in the constitution, which he rendered more democratic; became very popular, and was the foremost Athenian statesman of his time; instituted ostracism, and was himself the first sufferer from it.

Cli'tus, d. 328 B.C.; Macedonian officer, and foster brother of Alexander the Great, whom he accompanied in his expedition against Persia, and saved his life at the battle of the Granicus, 334 B.C.; appointed Satrap of Bactria, 328 B.C. In the same year a dispute occurred at a feast, and Alexander, excited with wine, killed Clitus with a spear.

Clive, Robert (Lord), 1725–74; British military officer and statesman; b. Styche, Shropshire; became a clerk in the service of the East India Company, 1743; war having broken out between the British and French, 1747, he entered the military service; in 1750 and 1751 defeated the French at Arcot, the citadel of which he held for eleven weeks with 80 English and 120 Sepoy soldiers against 7,000 native and 120 French troops, and then overthrew his enemies at Arni, Kaveripak, Kovilam, and Chingalpat; Governor of Fort St. David, India, 1755; waged war with success against the nabob, Surajah Dowlah, and took Calcutta, 1757; in June, 1757, with 3,000 men, gained a victory over the nabob's army of 60,000 men at Plassey; and was rewarded with the office of Governor of Bengal. He returned to England, 1760, and was raised, 1761, to the Irish peerage as Baron of Plassey; in 1764 was again sent to India to rectify the disorders which prevailed after his departure from that region. He returned, 1767. His enemies in Parliament accused him of having enriched himself by a tyrannical abuse of power, and a committee was appointed, 1773, to investigate his conduct. This inquest resulted in his acquittal. He became addicted to the use of opium, and committed suicide in London.



MOUTH OF CLOACA MAXIMA.

Cloaca (klō-ā'kă) **Max'ima,** the most remarkable sewer of ancient Rome, and one of the

few now in use; completed, 588 B.C., by Lucius Tarquinius Priscus; first designed to drain the Forum and the adjacent low ground, but extended to include other localities; terminates at the Tiber, where its mouth is still seen. Notwithstanding its age of nearly two thousand five hundred years, the structure is still in a good state of preservation.

Clock, a machine for measuring and indicating time by moving mechanism, as distinguished, for instance, from a *sundial,* which has no moving parts; especially at the present day, such a machine intended to be kept in a more or less permanent position, as distinguished from a *watch,* which is carried on the person. Every clock includes two series of parts, one to impart motion and transmit it to the hands or other indicators; another to regulate that motion so that the hands shall move uniformly. In modern clocks the motive power is usually a falling weight on an uncoiling spring, but it may be an electric motor, a water motor, a windmill, or any other regular source. The apparatus for regulating the motion, known as an *escapement,* is usually an oscillating piece, such as a pendulum or a balance wheel, and depends on the principle that such oscillations are performed, other things being equal, in equal times. In the simplest escapement the to-and-fro motion operates a ratchet that allows a toothed wheel to revolve by jerks, one tooth at a time. This wheel, actuated by the weight or other motive power, gives, in its turn, an impulse to the pendulum, thus maintaining its motion. The combination of weight and toothed wheel is attributed to the Saracens, who devised it as a substitute for the earlier clepsydra, or water clock, of the Greeks, which was operated by the slow and regular escape of water through a small orifice.

The first escapement is said to have been invented by Gerbert abt. 1000 A.D. The so-called "anchor" escapement was due to Hooke (1666–80), and the "dead-beat" escapement, which avoids sudden shocks, to Graham (1700). Pendulum clocks are regulated by altering the length of the pendulum; lengthening it makes the clock go slower. The contraction and expansion of the metal with varying temperature thus interfered with the clock's regularity, and many compensating devices have been invented to obviate this. Harrison in 1726 devised a "gridiron" pendulum of alternate steel and brass rods which, expanding at different rates, kept the center of oscillation at the same distance from the point of suspension. The wooden pendulum rods used by American makers effect the same result. Cheap clocks that keep time satisfactorily were probably first made to any great extent in the U. S. The first American maker seems to have been Eli Terry, of Windsor, Conn., who made clocks entirely of wood. No brass-wheel clocks were made in the U. S. until 1837. The first satisfactory inexpensive steel spring for clocks was devised in the U. S. The use of coiled springs as motive power, together with the use of machine processes, has led to the production of small but accurate clocks, and to the practical removal of the boundary line between these and the larger and coarser watches. (See WATCH.) *Electric clocks* are either those driven by electric motors, or, as the term is more generally used, those regulated by electric action, often from a master clock at some distance. The regulation, which is due to an electro-magnet, takes place at brief intervals, generally of a minute or two. See also DIAL.

Clo'dius, or Clau'dius, Pub'lius, surnamed PULCHER, d. 52 B.C.; profligate Roman tribune and patrician; committed sacrilege by intruding himself, disguised as a woman, into the mysteries of the Bona Dea, 62; was acquitted by bribery, though Cicero was a witness against him, and became tribune, 59; drove Cicero into exile; was killed by Milo, a partisan of Cicero and the political enemy of Clodius.

Cloisonne (klwä-zō-nā'). See ENAMEL.

Clois'ter, an inclosed court or yard surrounded by ambulatories, or covered walks, built as a place for exercise and recreation of the clergy in a cathedral, or the monks or nuns in a monastery. The open space in the center is called the cloister garth, and usually contains the well and garden. By extension the term cloister is applied to the whole of a monastery or similar institution.

Clo'sure. See CLOTURE.

Clothaire (klō-tăr') **I,** 497–561; fourth son of Clovis, king of the Franks; became king of Soissons, 511, when the dominions of Clovis were divided among his sons; by murdering two of his nephews obtained the sovereignty of Austrasia and Orleans, and reigned at Paris over all the former dominions of Clovis; his sons, Caribert, Gontran, Sigebert, and Chilperic I, divided the realm between them. CLOTHAIRE II, d. 628; son of Chilperic I; was a minor when he inherited the kingdom of Soissons, 584. His mother Frédégonde was regent until, 597. He put to death Brunehaut, Queen of Austrasia, and usurped the throne of that country, 613, becoming sovereign of all France; one of the Merovingian dynasty.

Clo'tho, in classic mythology, one of the three Fates (*q.v.*).

Clotil'da, Saint, d. 545; Queen of France; daughter of Chilperic, King of Burgundy; married, 493, to Clovis 1, whom she induced to profess the Christian religion; opposed Arianism; was canonized soon after her death.

Cloture (klō-tōr'), **or Clo'sure,** proceeding in the British House of Commons for closing debate and bringing on an immediate vote. It is a term of French origin, and the rule of proceeding grew out of obstructions to business made by the Irish members of Parliament as an avowed policy. In 1882 the speaker was authorized, when he was of the opinion that the house desired to come to a vote, to so inform the members, when a motion could be entertained thereupon to close the debate. In 1887 it was further provided that a member may claim to move "that the question be now put." Unless the chair holds this motion to be an infringement of the rules or an injustice

to the minority, he proceeds to take the vote on the closure, and if not less than a hundred members sustain it, the closure is adopted. Like results are obtained in the popular branch of legislative bodies in the U. S. by moving the previous question, but in Parliament the previous question has another purpose.

Clouds, collections of minute particles of water suspended in the atmosphere. While fog is principally formed by the cooling of the lower layers of the atmosphere, clouds are due



CIRRUS.

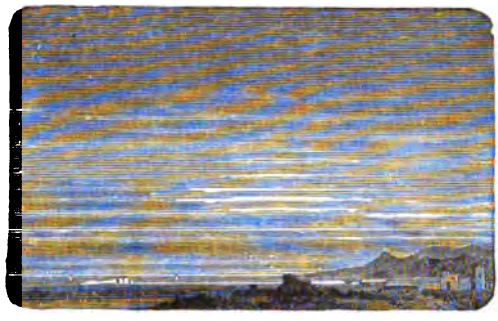
more especially to the rising currents which, when cooled to the dew-point, condense into cloud. The cloud masses, being heavier than the air, tend to sink, but the sinking takes place very slowly, partly because the water particles and the ice needles which compose the clouds are very small, and because the rising currents to which they owe their origin counteract the sinking process. Frequently the rising current mingles with a horizontal current, which carries with it the upper portion



CUMULUS.

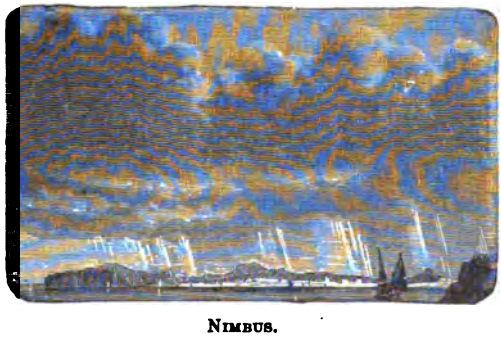
of the cloud and covers the sky with a uniform stratum.

The chief forms of clouds are the cirrus, cumulus, and stratus, which have been subdivided as follows: Cirrus are thin, fibrous, detached, featherlike clouds formed of ice crystals. They are the highest clouds, averaging over 29,000 ft., and move with the greatest velocity, their mean being 89 m. per hour. Cirro-stratus, or wane clouds, form a thin white veil, more or less fibrous, which produces halos and other optical phenomena. When the sky is mottled with them it is often called a "mackerel sky"; have an average height of 27,000 ft., and an average velocity of 70 m. per hour. Cirro-cumulus are flocks of small, detached, fleecy clouds, at an average height of 23,000 ft., and an average velocity of 82 m. per hour. Alto-stratus is a gray-blue veil, through which the sun and moon are



STRATUS.

faintly visible. Its mean height is about 15,400 ft., and its mean velocity 48 m. per hour. Alto-cumulus are large, more or less rounded balls, flat rolls or disks of fleecy clouds in flocks, white in color, except a dark shading here and there. They average 10,000 ft. in height, and have an average speed of 34 m. per hour. Strato-cumulus are large balls or rolls of dark clouds; average height, 6,200 ft.; average velocity, 22 m. Cumulus are piled-up clouds with conical or hemispherical tops and flat bases; are formed of rising currents of heated air, and therefore most common in summer and in tropical regions; average height, 4,700 ft.; average velocity, 26 m. per hour. Cumulo-nimbus is a massive cloud from which showers fall; mean height, 4,500 ft.; average movement, 33 m. per hour. Nimbus is a dark sheet of ragged cloud from which rain or snow usually falls. Its height averages only 2,900 ft. Stratus is either elevated fog floating in the air or a thin uniform layer



NIMBUS.

of cloud at a very low level (1,800 ft.), which moves only 16 m. per hour.

A cloud-burst is an extremely heavy rain over a small territory. It occurs only with local, not general, storms, most commonly in the hottest season and at the hottest time of day; occurs most frequently in the arid regions or on mountain sides. The rain sometimes

falls at the rate of 4 or 6 (and possibly more) in. per hour, but continues only a few moments. Meantime the phenomena of atmospheric electricity are usually marked. The flood of water that descends flows off rapidly, coming down the streams with a head of water which is often destructive. A distinction is usually drawn between cloudbursts and torrential rains. The latter belong to general storms, the former to local ones, the remarkable cloud formations and sudden clearing afterwards making the name appropriate for the former and not for the latter.

Clouet (klō-ā'), **François,** abt. 1510–80; French portrait painter; descended from a family of Flemish artists; became a court painter and a *valet de chambre* to the king; left many portraits of distinguished people of the highest interest from their remarkable fidelity and technical excellence. Among these are "Henri II," "Charles IX," and "Elizabeth of Austria," in the Louvre; and a notable "Dauphin Francis II and Marie Stuart."

Clough (klŭf), **Anne Jemima,** abt. 1822–92; English educator; b. Liverpool; sister of Arthur Hugh Clough; was influential in the founding of the N. of England Council for Promoting the Higher Education of Women; took charge, 1871, of a house of five women students at Cambridge, which developed into Newnham College, at the head of which she remained until her death.

Clough, Arthur Hugh, 1819–61; English poet; b. Liverpool; lived five years in Charleston, S. C.; educated at Rugby and Baliol College, Oxford; held a fellowship in Oriel College, Oxford, 1841–48; warden of University Hall and Prof. of English Language and Literature in University College, London, 1849–52; resided in Cambridge, Mass., 1852–53, engaged in teaching and literary pursuits; later held a post in the Education Department, London; published "The Bothie of Tober-na-Vuolich," "Poems on Life and Duty," "Dipsychus," a subtle dialogue expressing his hesitation between doubt and faith; "Amours de Voyage," and "Mari Magno." Clough was a man of strong religious feelings, but unfixed beliefs. He is the subject of Matthew Arnold's elegy, "Thyrsis."

Clo'ver, or **Tre'foil,** name properly applied to plants of the genus *Trifolium*, family *Leguminosæ*, comprising about sixty indigenous species in the U. S. and many in the Old World; used for other related plants which have three leaflets, as *Melilotus*, the sweet clover; *Medicago*, the bur clover; *Lespedeza striata*, the Japan clover; *Petalostemon*, the prairie clover, etc. The true clovers are invaluable in agriculture, not only for pasturage, but chiefly because of their power of appropriating atmospheric nitrogen by their roots and bringing up fertilizing material from the deeper soil. There are five chief species in cultivation. The most important is the common or red clover (*Trifolium pratense*). Others are the mammoth clover (*T. medium*); the crimson, scarlet, or carnation clover (*T. incarnatum*); the alsike clover (*T. hybridum*); and the common white or creeping clover or shamrock (*T. repens*). These are all natives of the Old World, although the last is supposed to be also native



RED CLOVER. *a*. Pod. *b*. Seed

to the U. S. They are all perennials, except the crimson clover, which is an annual; but they usually begin to fail in vigor after they have occupied the land two or three years.

Cloves, the unexpanded flowers of *Eugenia aromatica* and family *Myrtaceæ*. They are derived from an evergreen tree which is supposed to have existed originally in only five small islands, the Clove Islands, near the island of Jilolo. Clove trees are not now found on these islands, but they are largely cultivated in Brazil, in many islands of the Indian Ocean, in tropical Africa, and in some of the W. Indies. The tree varies from 30 to 40 ft. in height; is well branched, the branches forming a clustering crown. As soon as the buds change in color from green to red they are taken from the trees and dried by exposure to the sun and air, when they become brown in appearance. Unbroken cloves resemble a small, round-headed tack, and emit a peculiar oily, aromatic odor; the taste is spicy and pungent; the color deep brown; but on section the interior portion may be reddish. In addition to volatile oil, cloves contain a resin or gum and a peculiar tannin.

The oil of cloves freshly distilled is quite fluid, clear, and colorless, and becomes yellowish and finally reddish brown on exposure; specific gravity varies from 1.034 to 1.061; soluble in an equal volume of alcohol, in ether, and strong acetic acid. It is used as a flavoring substance, as a carminative, and sometimes as a local anæsthetic, particularly in cavities of teeth.

Clo'vis I, 465–511; King of the Franks; son and successor of Childeric; by a victory over the Romans and Gauls, obtained possession of Soissons, which became his capital; married, 493, Clotilda, a Christian princess, and about three years later was converted. The story of his conversion is that at the battle of Tolbiac (Zulpich), near Cologne, at which

being hard pressed by the Alemanni, he appealed to the god of Clotilda, promising that if victory were granted to his army, they would worship the Christian God. His conversion helped to bring the Teutonic races into closer communication with the Christian Church and Roman civilization. In 507 he defeated Alaric, King of the Visigoths, in a great battle near Poitiers, and added Aquitaine to his dominions; he chose Paris as his capital, 507, and there died. France was then divided among his sons—Thierri, Clodomir, Childeric, and Clothaire. His descendants are called Merovingians, from Merovig, the grandfather of Clovis. With him the Salic law entered France, and the alliance of the Church and State. With him, too, the distinctive history of France begins.

Clown, professional jester or buffoon. The character may have originated in the ancient Roman pantomime, which passed into the representations of the wandering acrobats of the Dark Ages, and thence into the mysteries and miracle plays, and later was developed into the harlequin by the Italians. The clown or court fool of Shakespeare's plays was a part of the household of mediæval princes and great barons. The court and pantomime fools wore a characteristic dress, motley coat and tight breeches, and carried a bauble or short staff with a ludicrous head. Sometimes asses' ears were added and a cock's comb. The clowns of Shakespeare are supposed to have been drawn from the "vice" in the mysteries, which the Italians again developed into the zany, a foil to the more serious and capable clown. It was the business of the zany to follow and caricature the clown by absurd imitations of his tricks.

Club, society of persons united for social, scientific, artistic, literary, or political ends, or for purposes of recreation. In the reign of Henry IV there was a club called "La Court de bone Compagnie." About the beginning of the seventeenth or the end of the sixteenth century the famous club at the Mermaid Tavern, London, was established. It had Shakespeare, Beaumont, Fletcher, Raleigh, etc., as members. About the same time Ben Jonson founded a club at the Devil Tavern, between Temple Bar and Middle Temple Gate. In 1659 the first political club, the Rota, was established. In 1669 the Civil Club, which exists to this day, was established, all the members of which are citizens. Some of these early political clubs played important parts in the history of the times. Such was the October Club, named after the cheer for which it was famed, October ale, the members of which were ardent Tories. The Saturday, Brothers, and Scriblerus Clubs, each having Swift as a member, and the Calves' Head Club, formed in ridicule of the memory of Charles I; the King's Head Club, founded by the unscrupulous Shaftesbury, and the Mug House Club, so called from the ale mugs used by the members, were among the more noted political clubs of the early part of the eighteenth century. Another unique club, the Kit-Kat, famous in literature, dates from 1700. Readers of Boswell are familiar with the Ivy Lane Club established by Dr. Johnson at the King's Head, a beefsteak house in Ivy Lane, and the Literary Club, founded by Johnson and Sir Joshua Reynolds, 1764. The purely social club of the present day owes its origin to the coffee houses of the eighteenth century, where congenial spirits used to meet for social intercourse and comradeship. Many of them have remained in existence to the present day. Among these proprietary clubs may be mentioned Almack's (1764) and Brooks's (1778). About the close of the Napoleonic wars the modern club era began with the organization of the Travellers' Club, 1814, by the Marquis of Londonderry, to-day one of the most exclusive of English clubs. In the U. S. club life owes its origin to the Union Club, founded in New York, 1836. The first club for women in the U. S. was the Sorosis, founded in New York, 1868.

Club'foot, technically known as TALIPES; a deformity, mostly congenital, which usually affects both feet. In the most common form the inner margin of the foot is elevated, the external one depressed, touching the ground; the middle and anterior portions are retarded in their growth, and the joints become immovable. Clubfoot acquired after birth is due to muscular paralysis or bone disease. In mild cases manual stretching of the foot, proper bandaging, and the application of a plaster dressing will suffice. More marked cases require the cutting of one or more tendons and use of appropriate apparatus.

Club Moss'es, or Ground Pines, small plants with a moss-like aspect belonging to club moss and ground pine families. These families, with the modern family *Isoetaceæ*, and several which are extinct, constitute a well-marked class of the "fernworts" under the name of *Lycopodinæ*, commonly called *Lycopods*.

Cluny (klü-nē'), town of France; department of Saône-et-Loire; on the Grône, 14 m. NW. of Mâcon. Here are the remains of a famous Benedictine abbey, founded 910 A.D. Pop. (1901) 3,691.

Clyde (klīd), **Lord.** See CAMPBELL, COLIN.

Clyde, principal river on the W. coast of Scotland; celebrated for the beauty of its scenery; it rises in the Lowther and Moffat Hills; at Lanark descends abt. 350 ft. in 4 m., and reaches the firth of Clyde at Dumbarton. Glasgow may be reached by the largest ocean steamers, and at Dumbarton the river is 1 m. wide; length, 73 m.

Clytemnestra (klīt-ĕm-nĕs'tră), wife of Agamemnon, King of Mycenæ; sister of Castor and of Helen; the paramour of Ægisthus; murdered Agamemnon on his return from Troy. She and Ægisthus were killed by her son Orestes.

Clytie (klī'tē), name of three mythical personages mentioned by Hesiod, Ovid, Pausanias, and Tzetzes. With Ovid she is a nymph loved by Apollo, the god of the sun, but who, having offended and being forsaken by him, pined away with her eyes fixed on the sun, and was

turned into a flower, which (from its ever turning toward the sun) was called heliotropium.

Cnidus (nī'dŭs), or **Gni'dos**, an ancient Greek city of Caria, Asia Minor; on the Ægean Sea and on the promontory of Triopion; one of the six cities of the Doric league called Hexapolis. Here were several famous temples of Venus, one of which contained a celebrated marble statue of Venus by Praxiteles. Cnidus was partly built on a small island, connected by a causeway with the mainland. Conon the Athenian defeated the Spartan fleet near Cnidus, 394 B.C.

Coach. See CARRIAGES.

Coadju'tor, in ecclesiastical law, one appointed to assist a bishop or other dignitary. Coadjutant bishops in the Roman Catholic Church are usually bishops of sees *in partibus*. In the Protestant Episcopal Church of the U. S. they are called assistant bishops.

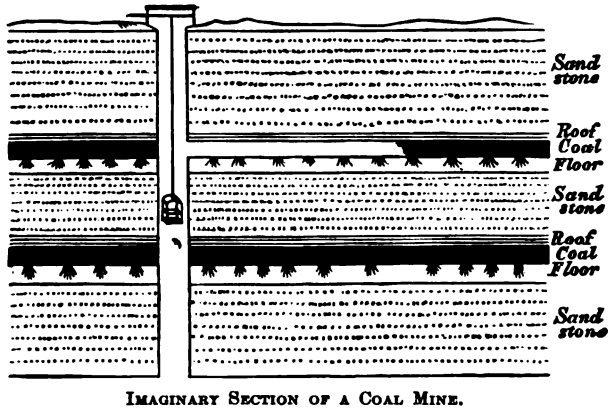
Coagula'tion, changing of a liquid to a substance of semisolid or curdlike consistency (the clot). Thus the white of an egg becomes solidified by heat. The casein of milk is coagulated (curdled) by rennet and many acids. The fibrin in the blood, chyle, and lymph is coagulated after the removal of these fluids from the living animal. In pneumonia, the coagulability of the blood is so much increased that clots form within the heart, and the usual cause of death is failure of the heart from heart clots and general weakness. In certain other diseases, like hemophilia, the blood does not clot readily, and bleeding is easily provoked and hard to check.

Coal, several carbonaceous substances derived from vegetable tissue. Mineral coals form part of an unbroken series which begins with woody fiber and ends with graphite; all derived from the decomposition of vegetable tissue when buried under water, earth, or rock. The different products of this progressive change, which is a sort of distillation, are peat, lignite, bituminous and anthracite coal, graphite, and asphaltum, which are solids; petroleum and water, which are liquids; carbonic acid, carbureted hydrogen, etc., which are gases. Of these all the solids, excepting asphaltum, are residual products, while that substance and the liquids and gases are the evolved products of distillates. The theory which finds most general acceptance at the present time is that the vegetable matter accumulated in peat bogs. The accumulations thus formed in different geological periods, but having their greatest development in the carboniferous age, were subjected to enormous pressures and to a slow and general distillation, resulting in the varieties of coal, from the more modern lignite to anthracite and graphite. In isolated instances the chemical changes have been hastened by local volcanic eruptions and lava streams, and in many districts widespread disturbances of the strata have facilitated the escape of moisture and volatile matter. All the varieties of coal shade into each other, and we have lignites



COAL.
Vegetable structure as seen under the microscope.

(coals retaining the texture of the wood from which they were formed) which exhibit every degree of approach to bituminous coals, semi-bituminous coals intermediate between these latter and anthracite, and graphitic anthracites by which the anthracites are connected with the graphites. Anthracite coal is the best and hardest; is nearly pure carbon; produces great heat, and burns with but little flame and no smoke. It is found very deep in the earth, having been formed early and subjected to great pressure. It is found in E. Pennsylvania and Nova Scotia. Bituminous, or soft coal, has a wider distribution than anthracite. It produces a bright flame and much smoke, due to unconsumed carbon. Cannel, or gas coal, is a variety of bituminous coal which burns from the end ("candle coal"), and is



IMAGINARY SECTION OF A COAL MINE.

a favorite for open grates. Lignite, or brown coal, may contain only fifty per cent. of carbon, which yields heat, the remainder being the volatile bituminous substances which yield smoke only.

Coal is found in nearly every country on the globe, the largest areas being in China, the U. S., Canada, India, Russia, Japan, Gt. Britain, Germany, and France. The coal-producing area of the U. S. is about 200,000 sq. m., the fields in Pennsylvania, Illinois, W. Virginia, Indiana, Ohio, Alabama, and Colorado being especially extensive. The anthracite coal-bearing area of Pennsylvania is estimated at 170,000 sq. m.; the workable area at 470 sq. m. The Appalachian, or E. bituminous field extends from New York to Alabama, a little over 900 m., and has a width of 30–180 m. The thickness of the coal varies from 100 to over 3,000 ft. The coal-bearing area of the NW. Provinces of Canada is estimated at over 65,000 sq. m. The coal fields of England and Wales have an area of 11,859 sq. m., and in two counties the coal-bearing strata are 12,000 ft. thick. In the SE. part of the Province of Szechuan, China, alone, the coal-bearing area is 21,700 sq. m. Germany, Austria, and the U. S. lead in the production of lignite coal. The production of the principal coal fields of the world, 1905, was estimated at 929,622,648 metric tons. The total production of the U. S. was over 300,000,000 short tons, valued at $476,756,963; of this the output of anthracite was 77,659,850 short tons; of bituminous, 315,259,491 short tons. Pennsylvania's output (anthracite and bituminous) had a value of $255,269,507. In 1905 the British Royal Commission issued a report in which the available resources of the proved coal fields were estimated at 100,000,000,000 tons, enough to supply the world's needs for 450 years. The number of coal mines in the U. S. by census report, 1902, was 12,472. The making of coke from coal is a great industry, the output in the U. S., 1905, being 315,259,491 short tons, valued at $334,877,963. Coal was used by the ancients only to a limited extent. It was first regularly mined in England abt. 1180, but was not introduced into London till 1240. The first discovery of coal in the U. S. was by Father Hennepin, near what is now Ottawa, Ill.; the first coal mined was in Pennsylvania, 1813, it sold for $25 a ton; the first regular shipments from the Pennsylvania mines began in 1820. See ANTHRACITE; CANNEL COAL; CARBONIFEROUS PERIOD; COMBUSTION; FUEL.

Coal'fish, English name for pollack, a fish related to the common cod. Name due to dark color of the back, which rubs off. It is found on both sides of the N. Atlantic, and is used for food. The oil from the liver is used to adulterate codliver oil.

Coal Gas. See GAS.

Coal Oil, general name for mineral oils. See PETROLEUM.

Coal Tar, substance obtained in the manufacture of gas from coal. It is thick, black, and sticky, and consists of a large number of compounds, many of which have been isolated and furnish the foundation of important industries. Preëminent among them are benzine, toluene, xylene, phenol or carbolic acid, naphthalene, anthracene, etc. The statement that a thing is "made from coal-tar" should be understood as meaning that the thing itself is generally not contained in the tar but it is made from some one or more of the things obtained from the tar. Coal-tar colors are dyestuffs made from the hydrocarbons prepared from coal tar. Prominent among these are the aniline, the azo colors, the colors from benzidine, etc.

Coast, margin of a land area, limited by the ocean or its gulfs or bays. The character of a coast line depends chiefly on two things: 1. Geological change of level, by which the sea is placed on the slope of the land mass; if by elevation of a smooth sea-bottom the coast line is of simple form; if by depression of a land area the coast line is irregular, the more so the more varied the relief of the submerged land. 2. The time during which the sea has stood at a given level, allowing its waves to cut back headlands into cliffs and form beaches and bars, and permitting rivers to build out deltas, thus simplifying the coast line from its first irregularity. The coast line of Europe is nearly 20,000 m. to an area of 3,816,400 sq. m.; of Africa, 15,000 to 11,600,000; of Asia, 30,000 to 17,310,000. The Atlantic coast line of the U. S. is 23,000 m. long; that of the Pacific coast, exclusive of Alaska, 15,500 m.

Coast'al Plain, one of the physiographic provinces of N. America, comprising a system of lowlands bordering the Atlantic and the Gulf of Mexico from New York Bay to the State of Vera Cruz in Mexico. It is in general from 50 to 200 m. broad, but extends N. in the valley of the Mississippi as far as the mouth of the Ohio. Topographically it consists of a plain or a series of plains, interrupted at the N. by a great system of estuaries, and everywhere more or less dissected by stream valleys. Geologically it includes Cretaceous, Eocene, Neocene, and Pleistocene formations.

Coast and Geodet'ic Sur'vey, bureau of the U. S. Govt., in the Treasury Department, charged with the survey of the coasts of the U. S., the coasts under the jurisdiction thereof, and the publication of charts, including sailing charts, general charts of the coast, and harbor charts. This includes base measures, triangulation, topography, and hydrography along said coasts; the survey of rivers to the head of tidewater or ship navigation; deep-sea soundings, temperature, and current observations along said coasts and throughout the Gulf and Japan streams; magnetic observations and researches, and the publication of maps showing the variations of terrestrial magnetism; gravity research; determination of heights; the determination of geographic positions, and to furnish reference points for state surveys. Tide tables are issued annually, in advance; "Coast Pilots," with sailing directions covering the navigable waters, and "Notices to Mariners" are issued monthly containing current information necessary for safe navigation.

Coast'guard, body of men stationed on the coasts of Great Britain and Ireland, under the Admiralty, to prevent smuggling and serving as a defensive force with certain powers of police.

Coast'ing Trade, trade carried on by vessels sailing along the coast between ports of the same country as distinct from oversea and foreign trade; in a looser sense trade between ports of neighboring countries on the same coast. The coasting trade is governed by special regulations. No foreign vessel can engage in the coasting trade of the U. S.; but since 1854 the coasting trade of Great Britain is open to vessels sailing under any flag.

Coast Range, or **Coast Ran'ges,** mountains adjoining and near the Pacific coast within the U. S. From Cape Flattery nearly to the S. line of Oregon they constitute a single range, sometimes called the Olympic, separated from the Cascade Range by a series of fertile valleys. Thence to the latitude of Mt. Shasta in N. California, the Coast Ranges merge with the extremities of the Cascade Range and the Sierra Nevada. Thence to Point Concepcion they are separated from the Sierra Nevada by the great valley of California. Midway the chain is divided by San Francisco Bay. Near Point Concepcion the range is joined by the terminal spur of the Sierra Nevada. San Bernardino peak, 100 m. from the Mexican boundary, is 11,800 ft. high.

Coat of Arms, originally the garment worn over his armor by a man of noble birth, and embroidered with the wearer's armorial bearings. Hence, in modern heraldry, an escutcheon with its bearings, as distinguished from the crest, motto, supporters, etc. See HERALDRY.

Coat of Mail. See ARMOR.

Coati (kō-ä'tē), or **Coati Mon'di,** animal of the raccoon family; total length, about 3 ft.; with coarse brown or reddish-gray hair. The body is long, the legs short; the tail long, thickly covered with hair and usually carried erect. A peculiar feature is the long sharp flexible nose which is turned upward in drinking. Coatis are good climbers, associate in troops, are nocturnal, and live on birds, eggs, and insects. The Mexican coati is found from Panama to S. Texas; the Brazilian species is distributed over the greater part of S. America.

Co'balt, a town in Nipissing District, Ontario, Canada, in the center of a district very rich in silver. The mines in the neighborhood, all discovered since 1903, produced in 1908 silver valued at $10,000,000. Pop. 4,000.

Cobalt, hard, white metal of specific gravity 8.5 to 8.9, brittle, with a granular fracture and easily powdered, quite malleable at red heat, attracted by the magnet, and even capable of receiving weak magnetic power when rubbed with a magnet, though arsenic destroys this property. It is unalterable in air and water at ordinary temperatures, though at red heat it decomposes water. Ores of cobalt are found in various parts of the world, though nowhere abundant, and almost invariably associated with nickel compounds and united with arsenic and sulphur. Cobalt is nowhere found native, except in some meteorites. The metal may be reduced from its oxide by heating in a current of hydrogen. It forms several oxides, of which the most important are the protoxide, CoO, and the sesquioxide Co_2O_3, both of which give a series of salts. Compounds of cobalt are applied for coloring, either as pigments or enamels. The principal preparation is smalt, or azure blue, which is a double silicate of cobalt and potassium. Zaffre, zaffer, or safflor, is the roasted ore mixed with twice its weight of quartz sand. It is used for coloring glass, enamels, and pottery glaze. The well-known willow-pattern plates are colored by this substance. Thenard's cobalt ultramarine is obtained by calcining phosphate or arseniate of cobalt with alumina, and Rinman's green, or cobalt green, consists of the mixed and ignited oxides of zinc and cobalt.

Cobb, Howell, 1815–68; American legislator; b. Cherry Hill, Ga.; member of Congress, 1843–51, during two terms of which he was Speaker of the House, and again a member, 1855–57; Governor of Georgia, 1851; Secretary of the Treasury, 1857, when he lowered the credit of the Government by buying its bonds at a premium of eighteen per cent and then borrowing money at twelve per cent to meet current expenses; president of the congress which met February, 1861, and framed the Confederate Constitution, but Jefferson Davis's aversion kept him afterwards in the background; in the Civil War became a Confederate major general, but took little part in military movements.

Cobbe, Frances Power, 1822–1904; English author and philanthropist; b. Dublin, Ireland; of English parents; was associated in the conduct of schools and reformatories for girls near Bristol, England.; later settled in London; an editorial writer; founded a society to prevent vivisection, and edited a journal in its interests; president of British Union for the Abolition of Vivisection, 1898–1904; published many works, chiefly rationalistic, including "Broken Lights," "Theism," and "Criminals, Idiots, Women, and Minors."

Cob'bett, William, 1762–1835; English political writer; b. Farnham, Surrey; son of a farm laborer; served in the army, 1785–91; emigrated to the U. S., 1792; edited in Philadelphia a federalist paper, *Peter Porcupine*; ridiculed the phlebotomy of Dr. Benjamin Rush and was forced to pay a fine of $5,000; returned to England, 1802; published in London, 1802–35, *The Weekly Political Register*, at first a Tory paper, but finally an advocate of radicalism; unjustly prosecuted on a charge of libeling the Government, fined £1,000 and imprisoned; in 1817–19 resided on a farm on Long Island, N. Y., to escape prosecution under statutes leveled against the independent press; originated the Parliamentary reports known as "Hansard's Debates"; elected to Parliament, 1832; chief popular works, an excellent "English Grammar" and "Advice to

Young Men and Women." He was a vigorous writer, distinguished for his common sense.

Cob'den, Richard, 1804–65; English statesman and economist; b. near Midhurst, Sussex; son of a poor farmer; after working as a commercial traveler, formed a partnership to sell calico fabrics in London; partner in a cotton-printing firm in Manchester, 1831; the most prominent member and orator of the Anti-Corn-Law League, formed 1839; elected to Parliament, 1841; advocated free trade, and was the chief agent in securing the repeal of the corn laws; reëlected to Parliament, 1847, 1852; one of the leaders of the Manchester school, or party which advocated electoral reform, a pacific foreign policy, and nonintervention in foreign quarrels; reëlected to Parliament, 1857; negotiated, 1860, a notable commercial treaty with France in the interest of free trade; one of the few British statesmen who sympathized with the Union cause in the American Civil War. His contribution to free trade was not in originality of speculation but in putting its doctrines forward as ethical laws and giving his crusade, on its behalf, a moral character, thus arousing enthusiasm for it.

Coblenz (kō'blĕnts), fortified city of Rhenish Prussia; at the confluence (whence its name) of the Rhine and the Moselle; 50 m. SSE. of Cologne. The old castle of the Electors of Treves, the church of St. Castor, and the Florins church are the most interesting buildings. On the opposite side of the Rhine is the fortress of Ehrenbreitstein. Coblenz was the capital of the ephemeral department of the Rhine and Moselle created by the French republic, 1798, but became Prussian, 1815. Pop. (1901) 45,146.

Cobra de Capello (kō'brä dā kä-pĕl'lō), Portuguese "hooded snake"; name usually limited to one of the most venomous of serpents, the *Naja tripudians* of the E. Indies, though the African cobra or asp is a similar species. The common name is derived from the ability of these snakes, when excited, to expand the skin of the back of the neck into the resemblance of a hood. On the back of this hood are usually two eyelike spots joined by a curved dark stripe, the whole resembling a pair of spectacles (it is sometimes called "spectacle snake"). The cobra attains 3 to 5 ft. or more. It feeds on lizards, fish, and other small animals. It is sluggish and easily destroyed. The ichneumon is its great enemy. Its venom, from two large glands in the head, often causes death in less than two hours after its introduction through a wound, though it is said to be harmless when taken into the stomach. The only remedy is cutting out or cauterizing the wound. Thousands die yearly from cobra bites. Snake charmers use the cobra to perform tricks; and with other serpents, it is an object of worship among many natives.

Co'burg, town of duchy of Saxe-Coburg-Gotha; on the Itz; 26 m. N. of Bamberg; capital of the duchy. On a hill is an old castle in which Luther was concealed, 1530; now a museum. Pop. (1900) 20,460.

Coca (kō'kä), drug derived from the leaves of *Erythroxylon coca,* of which there are two species, one in Bolivia and one in Peru and also cultivated in British India, Java, and Ceylon. Its active principle is cocaine (*q.v.*). The leaves resemble tea leaves. In Peru coca has long been used as a stimulant, a small quantity enabling one to withstand fatigue even with insufficient food, and it lessens the difficulty of respiration in mountain climbing. In the natives it produces vivid visions and emotional exaltation, but such effects are not experienced in Europe and the U. S. by those who chew the imported leaves. The habit of coca chewing, once formed, is hard to abandon, and induces many disorders of body and mind. In coca poisoning there is great nervous excitement with mania and delusions, followed by collapse.

Cocaine (kō'kä-ĭn), alkaloid obtained from the leaves of *Erythroxylon coca.* (See COCA.) It crystallizes in colorless, odorless prisms and has a slightly bitter taste. Its salts are soluble in water, the hydrochlorate being generally used. Since its introduction in 1884 cocaine has become a valuable local anæsthetic in minor surgery, especially about the eye, nose, and ear. It does not act when applied on the skin, but does paralyze the sensory nerves of mucous membrane. Care must be exercised in its use as death has been caused by even moderate doses. In small doses cocaine stimulates the brain and spinal cord, and in narcotic poisoning cocaine will avert a failure of respiration. The taking of cocaine as a stimulant has grown in the U. S. and Europe, and the sale of the drug is now being restricted, as the habit produces moral as well as physical deterioration.

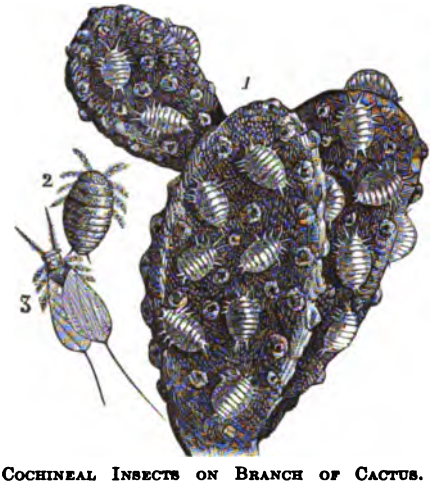
Coc'cus, the typical genus of the family *Coccidæ,* a group of bugs including the scale insects, bark lice, mealy bugs, etc. The cottony cushion scale, which at one time threatened the orange industry of California, has been almost completely exterminated by the Australian ladybug. From bugs of this family are produced the dyes kermes and cochineal, while to others we owe lac and China wax.

Cochin (kō-chĕn'), seaport and former capital of the state of the same name, Madras, British India; at the entrance of an extensive backwater or lagoon, 80 m. SSE. of Calicut. Here the Portuguese erected, 1503, their first fort in India. They were expelled from Cochin by the Dutch, 1663. The town was ceded to the British, 1814. The chief exports are teak timber, cardamoms, coir, etc. Pop. abt. 18,000.

Cochin (kō'chĭn) **Chi'na,** French colony on the delta of the Mekong River; in the S. of the Indo-Chinese peninsula; bounded N. by Cambodia, NE. by Annam, and elsewhere by the Chinese Sea and Gulf of Siam; is a portion of the former Annamese province of Champu; area, 20,000 sq. m.; pop. (1901) 2,968,529, the majority Buddhists. About one sixth of the total area is cultivated. The chief crop is rice; cocoanuts, sugar cane, and tobacco are grown.

There are four provinces (Saigon, Mytho, Vinh-Long, and Bassac), and one deputy is sent to the French legislature.

Cochineal (kŏch'ĭn-ēl), insect which yields the dyestuff carmine; native to Mexico, whence the finest quality still comes, but cultivated in several other hot countries, as W. Indies, Teneriffe, Madeira, Algeria, and Java. It lives on a species of cactus called the cochineal fig, and is the size of a small ladybird. It fastens itself to the plant and remains in contact with it until death. Just before they lay their eggs



1. Cochineal Insects on Branch of Cactus. 2. Female. 3. Male.

the insects are rich in coloring matter, and are then gathered. They are killed by hot water or steam, and then dried. About seventy thousand are required to make a pound of cochineal. Cochineal colors were formerly used for dyeing wool or silk crimson or scarlet. The colors are not very permanent, though brilliant and attractive. Carmine is prepared by treating a solution of cochineal with cream of tartar, alum, or acid oxalate of potassium. When a solution of cochineal is treated with an alkaline carbonate and alum, carmine lake is obtained.

Cochituate (kō-chĭt'ū-ăt) **Lake,** in Middlesex Co., Mass.; 18 m. W. from Boston; has an area of 800 acres at high-water mark. Dug Pond and Dudley Pond are tributary to it. The lake is connected by an artificial channel with Sudbury River, and is the principal source of water supply for the city of Boston.

Cochrane (kŏk'răn), **Thomas** (tenth Earl of Dundonald), 1775–1860; British naval officer; b. Amesfield, Scotland; entered the navy, 1793; distinguished in the Mediterranean; entered Parliament, 1806, and devoted himself to exposing abuses in the navy; accused of complicity in circulating a false report of Napoleon's death for speculative purposes, was fined, imprisoned, and expelled from Parliament and the navy, despite his protestations of innocence, 1814; organized the navy of Chile, 1818, and was a successful commander in the war with Spain; commanded the Brazilian navy, 1823–25, and the Greek army, 1827–28; was cleared of the 1814 charges, and restored to the British navy, 1832; vice admiral, 1841; admiral, 1851, and rear admiral, 1854.

Cocin'ic Ac'id, volatile acid found in the butter or oil of the cocoanut.

Cock, in its common and restricted sense the male of the domestic fowl; in a wider sense used for the male of various birds. It is figured on Babylonian cylinders, 600 B.C., but does not appear on Egyptian monuments, nor is it mentioned in the Old Testament, nor by Homer. The cock has figured largely in literature and art, being sacred to Mars, on account, perhaps, of his having been at an early date the god of agriculture. It is frequently introduced into paintings of the passion of Christ, and is the emblem of St. Peter. Among the early Christians it was symbolical of vigilance, and was carved on tombs as an emblem of the resurrection, metaphorically signifying the coming of light after the night of death, or announcing the general awakening of the resurrection.

Cock of the Plains. See Sage Cock.

Cockade (kŏk-ād'), badge, usually in the form of a knot or rosette, worn on the hat or cap by officers of the army or navy; also at times by citizens as a party distinction. The Bourbon cockade in France was white, that of Spain red. During the revolution of 1789 the French assumed the tricolored ribbon (red, white, and blue) as a badge of patriotism or the symbol of the new *régime.* It became also in the U. S. a badge of the Jeffersonian republicans until war seemed impending with France, 1798. In Great Britain a white rose was the badge of the Stuarts; the yellow cockade was introduced into Great Britain with William of Orange, and the black with the house of Hanover, and was a mark of both civil and military rank. Thence it passed into use as a part of the livery of coachmen and other servants.

Cockatoo', common name for the members of the family *Cacatuidæ,* a group of large par-



Tricolor Crested Cockatoo.

rots inhabiting Australia, New Guinea, the Philippines, and adjacent islands; distinguished by conspicuous crests, large bills, mod-

erate wings, and large, slightly rounded tails. They usually associate in large flocks, breed in hollow trees or crevices in the rocks, and feed on fruit, seeds, and larvæ of insects. Their cry is harsh, and as a rule they do not readily learn to pronounce words. The sulphur-crested



GREAT COCKATOO.

cockatoo, frequently seen in menageries, is the best-known species. It is a native of Australia. The great black cockatoo, of New Guinea, is the largest of the parrots. It is distinguished by its enormous bill, bare, red cheeks, glossy black plumage, and long cylindrical tongue which is tipped with a horny point.

Cock'atrice, fabulous monster or venomous serpent, which has been sometimes identified with the basilisk. It was said to be hatched from the cock's egg, and its breath and look were fatally poisonous. The word occurs in the English version of the Old Testament as the name of a venomous serpent.

Cockburn (kō'bŭrn), **Sir Alexander James Edmund,** 1802–80; British jurist of Scottish descent; elected to Parliament as a liberal, 1847; defended Palmerston's foreign policy, 1850; attorney general, 1851; chief justice court of common pleas, 1856, and lord chief justice court of queen's bench, 1859; presided in the Tichborne case; an arbitrator for Great Britain in the "*Alabama* Claims" tribunal, Geneva, 1871–72.

Cockburn, Sir George, 1772–1853;; British admiral; b. London; entered the navy, 1781; captain of a frigate, 1794; rear admiral, 1812; assisted in the capture of Washington, D. C., 1814; conveyed Napoleon to St. Helena, 1815; lord of the admiralty, 1818 and 1828; member of Parliament for many years.

Cockburn, George Ralph Richardson, 1834– ; Scottish-Canadian educator; b. Edinburgh; moved to Canada and became rector of the Model Grammar School for Upper Canada, 1858; in 1861, principal of Upper Canada College, an office which he held for twenty years; entered the Dominion Parliament, 1887; re-elected, 1891; member of the Univ. of Toronto for twenty years; esteemed as a thorough philologist, and one of the best Latin scholars that Scotland has produced.

Cockchafer (kŏk'chā-fẽr), the May beetle of Europe, represented in the U. S. by the June bugs, of which there are over sixty species. It is about an inch long and black in color. These pests eat the leaves of trees, sometimes completely stripping them, but as their life in the adult state lasts only a few days they do comparatively little damage. The larvæ, known as "white grubs," live from two to four years, burrowing in the soil, feeding on grass and other roots. No satisfactory means of exterminating them is known, though hogs will root up and eat the grubs.

Cock'er, Edward, 1632–abt. 1675; English engraver and educator; resided in London. His famous "Arithmetic," published after his death, had an enormous circulation, having passed through fifty-five editions from 1677–1758, and became a model for many later works.

Cocker, small active spaniel, weighing from 15 to 25 lbs., with a thick wavy coat. There is no particular standard for color, but black is the most popular. The small size of the cocker fits it for ranging in coverts, and it is much employed by British sportsmen in pheasant and woodcock shooting.

Cockfight'ing, the sport of setting two cocks to fight. It was popular with the Greeks and Romans, who also used partridges and quail for the sport, and was practiced in Great Britain for centuries till prohibited in 1849. It has also been popular in the U. S., though now generally prohibited. At present it is carried on in the Spanish countries and in the East. The cocks are neatly trimmed and cut so as to be lighter and give less for their antagonist to lay hold of. Metal spurs are often strapped on their legs. Setting several cocks to fight is called a main. In the Welsh main the survivors of the first set of fights were matched till there was only one survivor.

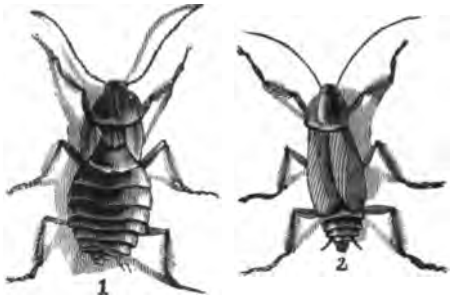
Coc'kle, name given to various mollusks. The common cockle and other species constitute an important food supply in the British Islands and other European countries. The species are numerous, and are chiefly tropical. Several occur on the Atlantic and Pacific coasts of the U. S.

Cock'ney, nickname applied to a certain class of Londoners; modern cockney mispronunciation consists in adding the consonant *r* to words ending in a vowel, as sofar for sofa, misplacing aspirates, dropping the *g* from the suffix *ing,* pronouncing *i* as *oi,* etc. In 1517 Henry VIII made an order with reference to the feast of the king of the cockneys, held on Childermas Day. The term cockney school was applied to a literary coterie consisting of Hazlitt, Keats, Leigh Hunt, Shelley, etc.

Cock'pit, in a ship of war, a compartment where the wounded men receive surgical treatment during an action. Formerly it was situated under the lower gun deck.

Cock'roach, Roach, or **Blat'ta,** a genus of straight-winged or orthopterous insects with flattened bodies, most species of which feed in the forests upon decaying wood, etc. But a

few species are partial to human dwellings, and have followed man over the world. In the U. S. the small imported "croton bug" or "black beetle" is widely found, and hard to get rid of, though borax or insect powder un-



COCKROACH. 1. Male. 2. Female.

sparingly applied will clear them out. The larger "common cockroach" is less common in the U. S.; it is 1 in. long, blackish brown, and omnivorous. It infests mills, bakeries, and ships, and gives a disgusting smell to everything over which it passes. Some tropical species reach a length of 2 in.

Cocles (kō'klēs), **Publius Horatius,** hero of Rome who, 507 B.C., with two companions, defended the bridge over the Tiber against the army of Lars Porsena while the bridge was destroyed behind him, whereupon he plunged into the river, and, although encumbered with armor, reached the opposite shore in safety. He was rewarded with as much land as he could plow around in a day, and a statue was erected in his honor. Macaulay has familiarized the legend in his "Lays of Ancient Rome."

Cocoa (kō'kō). See CACAO.

Co'coanut, fruit of the *Cocos nucifera,* a tree of the palm family. The genus *Cocos*



COCOANUT PALM, FLOWER, FRUIT, AND TREE.

(from *coco,* the Portuguese for monkey, in allusion to the resemblance of the end of the nut to a monkey's face) includes about thirty species, all tropical, and nearly all American. The cocoanut proper appears to have come originally from the E. Indies, but it has been so long in cultivation that it is widely distributed in all hot regions. The tree attains a height of 50 to nearly 100 ft., and its leaves may be as much as 20 ft. in length. The nuts are borne in clusters of a dozen or more, and on the tree are covered with a thick covering of fibers, while each nut is imbedded in a firm, woody husk. No part of the plant appears to be useless. Thus the fiber from the spathe is used in the making of ropes, matting, brushes, brooms, etc.; the fiber from the stems is extensively used in brushes; the shells are made into ornaments; the nuts furnish a nutritious food throughout the civilized world, and yield a valuable oil used in making candles and burned in lamps.

Cocoon (kō-kōn'). See CHRYSALIS and SILKWORM.

Co'cos Is'land, volcanic island, in the Pacific Ocean, SW. of Costa Rica, with steep rugged coasts and quite level interior; comprises about 9 sq. m.; is uninhabited, and is reputed to have been the place of concealment of treasure, jewelry, and plate sent there by wealthy inhabitants of the Spanish colonies on the neighboring mainland early in the nineteenth century, during the wars in which they achieved their independence from Spain. The belief that many of these valuables were never recovered led to a number of unsuccessful search expeditions.

Cod, fish of the family *Gadidæ,* the most abundant and important member of the group. The fish ordinarily reaches a length of 3 to 5 ft. and a weight of 10 to 40 lbs. Fish of 50 or 60 lbs. weight are not uncommon, and exceptional individuals have been taken weigh-



COD (*Morrhua Americana*).

ing from 100 to 150 lbs. It is found at moderate depths, 10 to 150 fathoms, in the N. Atlantic and Pacific, and while ranging S. to Japan, Oregon, and Virginia, is most abundant in the N. portion of its habitat. Notwithstanding the vast number of eggs, so few fish reach maturity that the drain of continued fishing has made perceptible inroads on the numbers of cod, and hatcheries have been established for their artificial propagation.

Cod, Cape. See CAPE COD.

Cod'dington, William, 1601–78; founder of Rhode Island; b. Lincolnshire, England; sent as crown magistrate to Salem, Mass., 1630;

became a merchant of Boston; opposed Winthrop and the clerical party with Vane, defending the Antinomianism of Anne Hutchinson and Wheelwright; led a dissenting party to Aquidneck, or Rhode Island, 1638; chosen chief magistrate to be guided by God's laws; was officially called governor, 1640–47; went to England, 1649, and in two years obtained a life commission to rule Aquidneck and Conanicut islands; commission revoked, 1652, at instance of Williams and Clark, but until 1655 he refused to submit, and retained possession of the records; became a Quaker and an advocate of liberty of conscience, 1665; was again governor, 1674–75.

Code, collection of laws made by public authority. In modern law it more commonly means a methodical arrangement of law, either customary or statutory, in chapters and sections. In a number of the U. S. the general statutes (see STATUTES) are arranged in this manner under the title of "Revised Laws, Revised Statutes," or "Codes." No argument for a code in the modern sense can be derived from the work of Justinian on the Roman law. The "Pandects," the great body of the Roman law, is, in the main, a mere collection of extracts from distinguished writers in their own language, and which had already become settled law. The "Institutes" are substantially a bare reproduction of a well-known work of Gaius, a distinguished Roman jurist. In Justinian's "Code of Roman Law," the word code is used as describing the whole mass of codified Roman law under the order of the Emperor Justinian, including the "Code" of that system; the "Institutes," "Pandects," and "Novels." These, taken together, constitute the *corpus juris civilis*, or whole body of civil law. The Theodosian code of Roman law is of comparatively little interest.

There are five principal French codes—the civil, civil procedure, commerce, criminal procedure, and criminal law. There are also codes on special subjects. The French codification is largely due to Napoleon I.

"Code of Louisiana," based on the "Code Napoléon" was principally prepared by Edward Livingstone; divided into three books, and is concerned with civil as distinguished from criminal law. Mr. Livingstone also prepared a draft of a penal code for the state, which was not adopted, as well as one for the U. S. The "New York Code of Procedure" was prepared to assimilate law and equity, and to have but one form of action. It assumes to regulate in a general way both pleadings and practice, and to state in a condensed form the general rules. A large body of case law has grown up in connection with the code which is collected in "Annotated Codes" and works on practice.

Code, Telegraph'ic, list of words used to reduce the cost of telegrams or to secure secrecy for a message. Elaborate compilations of this nature have been published in which the code words are arranged alphabetically, and the phrases or sentences which they represent are grouped according to subject matter, so as to facilitate the compiling and deciphering of code messages. In certain countries, especially in the Balkan Peninsula, code messages are prohibited, mainly for political reasons. The code principle is now extended to trade catalogues, in which an arbitrary code word is prefixed to each item described. This facilitates ordering by avoiding mistakes of description.

Co'dex (plural **Cod'ices**), in modern Latin, a manuscript volume, especially applied to a copy of the Scriptures. They are divided into uncial and cursive. The former are older, written on parchment in large or capital letters; the latter date from the eighth to the fifteenth century, and are written in small or minuscule letters. The uncial codices of the Greek Testament are designated by the large letters of the Latin alphabet (A, B, C, D, etc.), the cursive by figures (1, 2, 3, etc.). There are now over 100 uncial MSS. (counting all the fragments; only three or four are complete) and 3,553 cursive MSS., as counted by Gregory, 1890. See BIBLE.

Codex Alexandri'nus (designation A), third in antiquity of the great uncial (or large letter) extant manuscripts of the Bible in the Greek language; contains 773 leaves of the Old Testament (in the Septuagint version), with some deficiencies in the Psalms, and all the books of the New Testament, with a few chasms (Matt. i–xxv, 6; John vi, 50, viii, 52; II Cor. iv, 13, xii, 6) where leaves are wanting. To these it adds the one genuine, and a fragment of the apocryphal, Epistle of Clement of Rome to the Corinthians. The Catholic Epistles follow the Acts; then come the Pauline Epistles, then that to the Hebrews before the Pastoral Epistles; the Apocalypse, which is rare in extant manuscripts, stands at the close of the New Testament. This codex is now in the British Museum, having been presented to Charles I, 1628, by Cyril Lucar, Patriarch of Constantinople, who had previously been Patriarch of Alexandria, from which city he brought the manuscript. It is in quarto form, about 13 in. high and 10 broad, each page being divided into two columns of fifty lines each. It is written on thin, fine, and very beautiful vellum, in uncial letters of elegant yet simple form, and without any space between the words. See BIBLE; CODEX.

Codex Be'zæ or **Cantabrigien'sis** (designation D), uncial manuscript, probably of the sixth century, containing the four Gospels and the Acts in Greek and Latin on opposite pages; presented to the Univ. of Cambridge, 1581, by Theodore Beza, who obtained it during the French civil wars, 1562, when it was found in the monastery of St. Irenæus at Lyons. This manuscript has several peculiar features. The Gospels stand Matthew, John, Luke, Mark, an order found also in some of the manuscripts of the Old Latin version. The peculiarities in the text are striking, consisting of interpolations, sentences recast, and occasional omissions. See BIBLE; CODEX.

Codex Ephrae'mi, or Codex Ephraemi Sy'ri Rescrip'tus (designation C), ancient and valuable palimpsest manuscript of portions of the

Greek Bible, preserved in the National Library in Paris; brought from the East by Andrew John Lascar, a learned Greek patronized by Lorenzo de' Medici, and Catherine de' Medici carried it to France. The ancient writing is read with difficulty, having been erased about the twelfth century in order that the vellum might be used for transcribing some Greek works of the Syrian Father Ephraem. The treasure which lay below was first noticed by Peter Alix in the latter part of the seventeenth century.

Codex C is an uncial manuscript, about the size of Codex A, but written in characters a little larger and somewhat more elaborate, and with but one column on a page. All its characteristics point to a date as early as the fifth century. See BIBLE; CODEX.

Codex Sinait'icus (designated ℵ *aleph*), most recently discovered of the nearly complete uncial manuscripts of the Greek Bible, and inferior to no other in antiquity, authority, and completeness; found by Constantine Tischendorf in two parts, 1844 and 1859, in the Greek convent of St. Catharine on the range of Mt. Sinai. It is written on vellum sheets of extreme fineness and beauty, the delicate skins of antelopes or of wild asses (probably the former); consists of 346 leaves, of which 199 contain twenty-two books of the Old Testament and Apocrypha in the Septuagint version, beginning at the first book of Chronicles; while the remaining 147 present the whole of the New Testament, the Epistle of Barnabas, and a part of the Shepherd of Hermas. It is written in uncial letters of exceeding beauty and simplicity of shape, approaching closely to the forms of the best papyri. Such testing characters as A, Δ, E, Π, Σ, are as unadorned as possible, without flourishes, knobs, or thickened points at their extremities—a proof of antiquity. It resembles the "Vatican Codex" in the absence of initial letters larger than the rest, which seem to have been regularly used after the beginning of the fifth century. It has but little punctuation, and that in the oldest manner. Its peculiarities of orthography and etymology belong to a period as early as the fourth century of our era. See BIBLE; CODEX.

Codex Vatica'nus (designation B), beautiful uncial manuscript of the Greek Bible in the Vatican Library, dating from the fourth century. Its marks of antiquity are similar to those of the Sinaitic codex; and indeed Tischendorf is confident that it is one of thirty copies of the Scriptures which Eusebius, the Church historian, had prepared by order of the Emperor Constantine, 330, for the churches of Constantinople. It presents three narrow columns on a page, except in the poetical books of the Old Testament, which, as in the "Codex Sinaiticus," are written stichometrically (in verses clause by clause, according to the sense) in two columns. It is written on fine, thin vellum, in a square, plain, and noble style of handwriting, being a close resemblance in shape to that of the Herculanean papyri. The manuscript contains the greater part of the Old Testament, and the New as far as Hebrews ix, 14. It appears to have belonged to the Vatican Library from the latter part of the fifteenth century. Its earlier history is unknown, but Tischendorf regards it as the work of an Alexandrian scribe. In critical authority it is inferior to no other manuscript. See BIBLE; CODEX.

Codicil (kŏd'ĭ-sĭl), addition to or qualification of a will. It may add to or take from, explain, alter, confirm, republish, or revive any will with which it is incorporated. A will may have several codicils, in which case all the codicils form a part of the will to which it is attached or refers. A codicil revokes so much of a will as is inconsistent with it. Codicils must be executed with all the formalities required for the execution of wills; and due execution of a codicil cures all defects in the execution of the will to which it relates, and proof of the execution of the codicil makes unnecessary proof of the execution of the will itself.

Cod'ling, or Cod'lin Moth, small moth, the larva of which is one of the most important enemies of the fruit grower. The larva is the well-known worm found feeding near the core of apples. The moth lays her eggs in the blossoms just as the petals fall, and the remedy is to spray the tree at this time with Paris green.

Cod-liv'er Oil, an oil obtained from the liver of the cod. It is prepared in Great Britain, Newfoundland, and the U. S., but chiefly in the N. part of Norway. Until 1853 this oil, as a food and therapeutic agent, was a crude, brown-colored product of domestic industry, difficult of digestion, not well supported by patients, and loathsome to taste. Peter Möller, of Norway, took the manufacture out of the hands of the fishermen, and in 1853 introduced a steam process. In this selected livers are washed until free from impurities, and then minced and heated externally by steam to 100° to 102° F. The oil as it exudes is drawn and filtered. This oil, pale yellow in color, is not a refined product, but the pure, fresh oil, as it existed in the cells of the living fish. The constitution of cod-liver oil has been an object of curiosity to scientists. P. Heyerdahl, Peter Möller's chemist, in 1891 established the fact that the fats of the oil consist of some hitherto unknown compounds of glycerin with fatty acids. The acids of two of them he separated—one as a bromide, therapic acid, and the other as a hydroxy acid, jecoleic acid, each being present in the oil to the extent of about twenty per cent. The medicinal properties of the oil are due to these acids and to the constituents of bile, with its iron, phosphorus, etc. A course of cod-liver oil builds up tissue, increases body weight, and raises the number of red cells in the blood. It may be rubbed into the skin, and for some skin diseases is the main remedy. It is invaluable in chronic phthisis, chronic rheumatism, and most wasting diseases. A teaspoonful, three times a day, is a good dose. To avoid its disagreeable taste it is prepared in emulsions and capsules. It should be kept from contact with air until it is to be taken by the patient.

Cod'rington, Sir Edward, English admiral; b. Gloucestershire; served as captain of the *Orion* at Trafalgar, 1805; vice admiral, 1821; commanded the English, French, and Russian fleets which defeated the Turks at Navarino, 1827; recalled on the pretext of having gone beyond his orders; admiral, 1837.

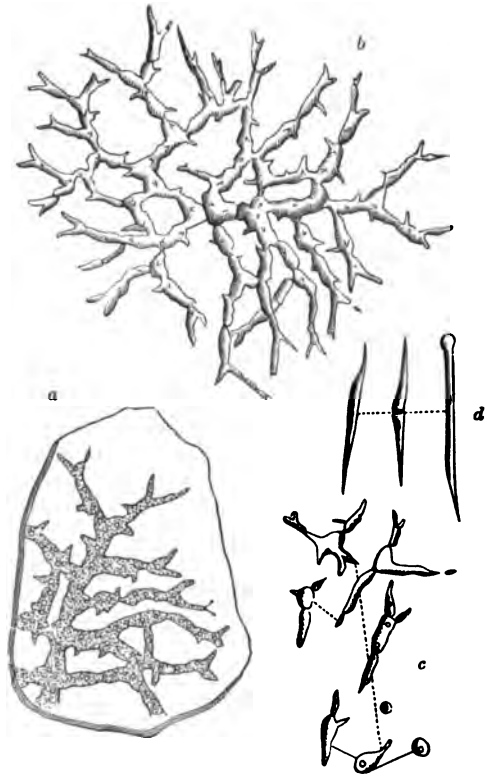
Codrington, Sir William John, 1804–84; British general; son of the preceding; entered the army, 1821; major general by brevet, at Varna, and distinguished himself at the Alma and at Inkerman, 1854; directed the attack on Sebastopol, 1855; commander in chief of the army in the Crimea, 1855; member of Parliament, 1857; Governor of Gibraltar, 1859; general, 1863.

Co'drus, last King of Athens; supposed to have reigned abt. 1060 B.C. An oracle having predicted that the people whose king was slain by the enemy should be victorious, Codrus went in disguise to the Dorian camp, and provoked a quarrel in which he was killed.

Coeffi'cient, in algebra, one of two simple or compound factors whose product constitutes a term. Thus in the term 2ab, 2a is the coefficient of b, and 2 of ab. In the latter case 2 is frequently called the "numerical coefficient" of the term, the other being distinguished as "literal coefficient." It is usual, however, to restrict the term "coefficient" to the former.

Coehorn (kō'hôrn), **Menno van** (Baron), 1641–1704; Dutch military engineer; b. near Leeuwarden, Friesland, 1641; early showed talent for the construction of fortifications; famous by the invention and use of the small mortar that bears his name; brigadier general, 1688; distinguished at Fleurus and in the defense of Namur against Vauban; introduced the bayonet among the Dutch infantry abt. 1680; built numerous fortifications on a modification of the bastioned system adapted especially to the flat surface of Holland; retook Namur, 1695; as lieutenant general of engineers had charge of all the fortresses of Holland; commanded a corps in the war of the Spanish Succession, and distinguished himself by the capture of Bonn and numerous other important posts.

Cœlenterata (sē-lĕn-tē-rā'tă), a class of saclike animals with no distinction between digestive and body cavities. The body wall consists of two germ layers, with occasionally a gelatinous layer between them. From one are developed muscles, nerve centers, and sense organs; while the other, the inner layer, is more adapted for digestive and excretory purposes. A peculiarity of both layers is the formation of thread cells or nettle cells, which are used as a means of defense and for killing the prey. These thread cells are sacs filled with a poisonous fluid, and provided with a long hollow thread through which upon irritation the poison can be conveyed into the tissues of other animals. The larger forms, like the Portuguese man-of-war, produce severe effects upon the human flesh, but the smaller ones usually are without effect on man. Most of the Cœlenterates are marine, a few only occurring in fresh water. Some (the jellyfish or medusæ) are free swimming, others (sea



SPONGIÆ. *a*, entire animal on a shell of *Placuna acenta*; *b*, *c*, the sponge removed, the branches in different stages of growth; *d*, spicules.

anemones, corals, hydroids, sponges) are fastened to some object during their mature life.

Cœlius (sē'lĭ-ŭs), **Lucius Cœlius Antipater,** Roman historian of the second century B.C., wrote a history of the second Punic War in seven books; paid more attention to style than his predecessors, and dedicated his work to L. Ælius Stilo, the famous grammarian; Livy, Plutarch, and other writers used him as a source.

Cœnobites (sĕn'ō-bīts), ascetics who lived in communities instead of alone as did the anchorites or hermits. Pachomius of Egypt first founded a cœnobium in the fourth century. Basil, Benedict, and Jerome express decided preference for communal life, and it became the rule in W. monachism.

Cœur d'Alène (cŭr-dă-lăn') **In'dians.** See SALISHANS.

Cof'fee, (1) the berries of *Caffea arabica*, a tree which when wild reaches a height of 10 to 30 ft., and bears but few branches; and (2) a beverage made from these berries after roasting and grinding. The tree grows wild in Central Africa and in Mozambique, and originally was native to Abyssinia and Arabia.

It was first cultivated in Java during the seventeenth century, and later in the W. Indies and S. America, now cultivated in nearly all tropical and subtropical countries. A distinct species of coffee plant is the Liberian coffee plant, which seems to be more hardy than the *Caffea arabica*. Most coffee comes from plantations laid out in quadrangles, the ground being kept well weeded. When cultivated the tree is frequently pruned, so that it is only 6 to 10 ft. in height, while its branches almost touch the ground. The leaves of the coffee tree are oblong, and 3 to 5 ins. long, leathery and shiny. The flowers are snow white, exceedingly fragrant and small, being clustered



COFFEE LEAF, FLOWER, AND BERRY.

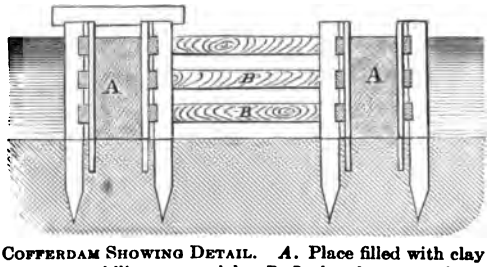
among the leaves. It has a succulent fruit which, when ripe, is dark red, and contains two cells, each of which contains a single seed. These seeds are hard, semiellipses, and form coffee nibs, coffee berries, or coffee beans. There are a number of species of coffee which vary in their characteristics according to the portion of the world in which they are grown. One of the most noteworthy of the various varieties of coffee is that which is known as Mocha, which comes from Arabia, and which is thought superior to any other form. Mocha coffee beans are small greenish-gray masses of the shape first described. The Java or E. Indian beans are large and yellow and the Jamaica smaller and of a greenish tint. Caffeine, the alkaloid of coffee, is employed in medicine both as caffeine and as citrated caffeine, being soluble in about seventy-five parts of water.

When taken internally, coffee, or its alkaloid caffeine, produces a rapidly stimulating effect. It produces an increased rapidity of thought, and enables the individual who takes it to do more intellectual work in a given time than he could do otherwise, but at the expense of nervous energy. A period of reaction is apt to follow its use. The empyreumatic oil is probably the cause of the "biliousness," so called, sometimes produced by coffee drinking. The object of roasting coffee is to render the seeds more readily pulverizable, and to develop the peculiar aroma and taste which is due to the presence of an empyreumatic oil. The seeds under these circumstances become a chestnut brown, and lose about eighteen per cent of their weight.

Coffee Houses, places where coffee and other refreshments are served to customers; established at Constantinople, 1554, in London, 1652, and Paris, 1662. Before the general introduction of newspapers, coffee houses were important centers or sources of information, where people assembled to learn the news and discuss politics. See CLUBS.

Cof'fer, a casket for keeping jewels, money, etc.; in architecture term applied to the sunken panels in vaults and domes, or to deep panels in ceilings; in fortification, a particular kind of caponnière.

Cof'ferdam, in civil engineering, a watertight inclosure for laying the foundation of bridge piers, dams, wharves, etc. Cofferdams are often constructed of piles in two rows,



COFFERDAM SHOWING DETAIL. *A*. Place filled with clay or puddling material. *B*. Inclosed space from which water is pumped.

with clay packed between. When finished, the water is pumped out by steam power. Where the water is too deep for cofferdams, various forms of the caisson are used; in which case the pier is sometimes gradually lowered to the bottom of the stream.

Cof'fin, Charles Carleton, 1823–96; American journalist and lecturer; b. Boscawen, N. H.; during the Civil War he was war correspondent of the *Boston Journal*. Among his books are "Days and Nights on the Battle-field," "Four Years of Fighting," "Boys of '76," "Story of Liberty," "Old Times in the Colonies," "Building of the Nation."

Coffin, Sir Isaac, 1759–1839; English admiral; b. Boston, Mass., of a Nantucket family. His father was collector of the port of Boston; entered the British navy, 1773, serving against the U. S. in the Revolution. He had a strong regard for his native land, and attained the rank of admiral of the white, 1830; visited Nantucket, where he founded and endowed the Coffin School, 1826.

Coffin, box to contain a corpse for burial. The Egyptian coffins were commonly made of wood and often richly painted; they are called mummy cases. Stone coffins were also used by the Egyptians, and in this they were imitated by the Roman artists of the empire (see

SARCOPHAGUS); and the bodies of persons of high rank are often found in stone coffins in more recent times.

Coffinhal (kō-fē-näl'), **Jean Baptiste**, 1754–94; one of the most atrocious characters of the French Revolution; b. Aurillac, Cantal; was practicing law in Paris when the revolution broke out; embraced the new ideas with fanaticism, acted as president of the Jacobin Club, and was, 1792, appointed first justice, then vice president, of the revolutionary tribunal. Some of the most odious verdicts of that tribunal must be laid to his charge.

Cognac (kōn-yäk'), town of France; department of Charente; on the Charente; 24 m. W. of Angoulême; has an old castle, in which Francis I was born. In 1526 an alliance of France, England, the Pope, Milan, and Venice, against Charles V was concluded here. Brandy is the chief export. Pop. (1900) 19,483.

Cog'nates. See AGNATES.

Cogno'men, Latin word signifying a surname; the last of the three names usually borne by ancient Romans of good family. Cicero, for example, was the *cognomen* of the great orator, Marcus Tullius Cicero; served to designate the family to which he belonged, as the other two names—*viz.*, the *prænomen* and the *nomen*—served respectively to denote the individual and the class to which his family belonged.

Cohe'sion, in natural philosophy, the force by which the particles of homogeneous bodies are kept attached to each other, and with which they resist separation. Adhesion denotes the attractive force existing between two different bodies brought into contact, as a drop of water on a plate of glass; or between two bodies of the same matter, as two lumps of lead when their smooth surfaces have been pressed together.

Cohoes (kō-hōs'), city of Albany Co., N. Y.; on the Mohawk, at its junction with the Hudson; has a very large cotton mill. The Cohoes Falls are within the city limits. (Pop. (1905) 24,183.

Co'hort, in the armies of ancient Rome, the tenth of a legion; consisted usually of 600 men. The prætorian cohort was a body of picked troops who attended the commander of the army, and at a later period formed the guard of the emperor.

Coin. See NUMISMATICS.

Coin'age, (1) the art, act, or practice of stamping metallic money. (2) Coin, coined money; a piece of metal of a certain weight and fineness issued as a measure of value and instrument of exchange by the government, and bearing its authorized stamp. Before the invention of the art of coining, traffic consisted of barter. Among pastoral people values were estimated in the produce of the land. This practice gave way to the use of different kinds of metals, which by weight passed as measures of value of commodities. The system of weights is supposed to be of Assyrio-Babylonic origin. The measure of value throughout W. Europe was the Roman pound weight of silver bullion, known in England as the Troy pound of 12 oz. Gold coinage was first successfully introduced into England by Edward III. In 1717 gold and silver were declared to be unlimited legal tender. At the great recoinage of 1816 gold was declared to be the only legal measure of value and legal tender to an unlimited amount, and the sovereign (£1) was struck to represent the value at that time of 20*s.* in silver. The coinage of American colonies was based on that of England. The earliest colonial coinage was in Massachusetts, 1652. From 1778 to 1787 the power of coinage was exercised not only by the confederation in Congress, but also by several states. In the reform of 1792 the Spanish milled dollar was taken as a model; the law provided for the coinage of eagles of the value of $10, half and quarter eagles, dollars, with halves, quarters, dimes, and half dimes, and cents and half cents of copper. The law of 1849 authorized the coinage of gold dollars and of double eagles; that of 1851 authorized the coinage of silver three-cent pieces; that of 1852 provided for a three-dollar gold piece. In 1857 the coinage of half cents was discontinued, and a nickel cent substituted for that of copper. In 1864 the bronze cent was substituted for nickel, and two-cent pieces of the same metal were authorized. In 1865 the nickel three cent was instituted, and 1866 the nickel five cent. The act of 1873 discontinued the silver half-dime and three-cent coinage and the silver dollar, and established a trade dollar of 420 grains for use in E. trade, whose coinage was limited, 1876, and abolished, 1887. The coinage of the three-dollar and one-dollar gold pieces and three-cent nickel piece was abolished, 1890. The purpose of alloying gold and silver with a base metal in coins is no longer, as in earlier periods, to debase the coins, but to increase their durability. In the U. S. the gold dollar "at the standard weight of 25.8 grains" is the unit of value. The gold coins must consist of $\frac{900}{1000}$ pure gold and $\frac{100}{1000}$ alloy. The annual coinage of the world is estimated to be: Gold, $455,427,085; silver, $172,270,379; Great Britain's aggregate share being $56,772,093. The domestic coinage of the U. S., 1908, amounted to $131,638,632 gold coin, $12,391,777 subsidiary silver coin, $1,468,738 minor coin. No silver dollars were coined, all bullion purchased for that purpose having been exhausted. The stock of money of the principal countries of the world, 1906, was $13,215,400,000, of which $6,483,500,000 was gold and $3,176,000,000 silver. Nearly seventy-five per cent of the gold was held by the U. S., $1,420,800,000; France, $1,032,600,000; Germany, $917,400,000; Russia, $854,900,000; United Kingdom, $559,100,000. The same countries held fifty per cent of the stock of silver. One third of the aggregate of silver is held in India and China. See BULLION; CURRENCY; DEMONETIZATION; MINT; SILVER COINAGE IN THE U. S.

Coir, fiber of cocoanut and other palms; a valuable material for ropes, mats, etc.; is

produced from the fiber of various trees, especially the gomuti palm; is largely produced in Malaysia.

Coke, Sir Edward, 1552–1634; English jurist; b. Mileham, Norfolk; rose rapidly in his profession, becoming Solicitor General, 1592; Speaker of the House of Commons, 1593; Attorney-General, 1594; Chief Justice of the Common Pleas, 1606; and Chief Justice of the King's Bench and Privy Councilor, 1613. After his appointment to the Common Pleas his attitude became that of a strong supporter of civil rights. The attempt of the king to give to the royal proclamation the force of law was stoutly resisted by Coke, who won over the other judges to his opinion. Three years later he was removed from office. He became an enemy to the court party, and as member of Parliament, 1621, was one of the foremost champions of parliamentary privilege against the king's attacks. He drew up the great protestation in support of the right of freedom of debate. The king tore it from the journal of the House, dissolved Parliament, and Coke paid the penalty of his zeal by imprisonment in the Tower. He carried his opposition into the next reign, and the petition of right, 1628, was framed and passed largely through his efforts. Of his "Four Institutes," the so-called "Coke upon Littleton" is the most famous. His "Law Reports" are equally well known.

Coke, Thomas, 1747–1814; first bishop in the U. S. of the Methodist Episcopal Church; b. Brecon, Wales; became a minister of the Church of England, but later joined Wesley; was made a bishop for the U. S. by Wesley, 1784; ordained Asbury the same year as joint superintendent of the church in U. S., but did not confine his labors to that country; traversed Great Britain and Ireland frequently, and crossed the Atlantic eighteen times; founded the Wesleyan missions in the E. and W. Indies, in Gibraltar and Sierra Leone, and expended nearly all his large fortune in these undertakings; died on a voyage to India, and was buried at sea.

Coke, residue obtained from bituminous coal by distillation or by heating with an almost entire exclusion of air. A ton of coal produces about two thirds of a ton of coke, which, as it consists almost entirely of carbon, produces a more intense heat than the coal from which it is made. The coke produced in gas manufacture is a by-product, used locally for heating and steaming; that specially made in ovens is employed in the melting of pig iron in cupolas, in the smelting of iron, copper, and lead in blast furnaces. The use of coke in making pig iron was first successfully achieved by Darby, 1735, at Coalbrookdale, Shropshire, England. In the U. S. William Firmstone first made pig iron successfully with coke, 1835, but it was not until 1837 that coke was used for any considerable length of time in the Lonaconing furnace in Maryland. The Connellsville coke region in Pennsylvania has become the foremost seat of this industry in the U. S. Regular manufacture in that district did not begin until 1860. Coking was formerly largely carried on in piles or mounds, a method analogous to that used in making vegetable charcoal, but is now generally done in ovens or kilns of brick or stone. On the Continent, and to a limited extent in England and the U. S., other forms of coke ovens are used, generally massive chambers of fire brick, in whose sides and bottom flues are arranged in which the waste gases are burned, thus heating the coal more rapidly. These ovens do much quicker work, afford a greater yield, and permit of the making of good coke from coal which could not be used in the "beehive" oven. They admit also of the recovery of the by-products—the tar and ammonia in the gases of distillation. According to the report of the U. S. Geological Survey, the coke production of the U. S. for 1908 was 36,410,225 long tons. The principal producer was Pennsylvania. See COAL.

Co'la, more correctly KOLA, nut of the *Cola acuminata,* a tree growing in Africa; depends for its activities upon two alkaloids, colanine and caffeine. Its action upon the body is partly that of coffee and partly that of coca. It has been used in sick headache, seasickness, and feebleness of the circulatory and nervous systems.

Colbert (kōl-bār'), **Jean Baptiste,** 1619–83; French financier; b. Rheims; entered the service of Cardinal Mazarin, 1648; Secretary to the Queen, 1654; appointed Controller General of the Finances, then in a ruinous condition, 1660; reformed the financial system, and established economy in the government; in the course of twenty years raised the gross revenue to 115,000,000 livres; while the expense of collecting it was reduced to about 30,000,000; promoted commerce and manufactures; opened canals and roads; founded colonies in America; also made reforms in the Department of Marine, of which he was appointed minister, 1669. He was a patron of literary and scientific men, and the founder of the Academy of Inscriptions and Academy of Sciences. No minister perhaps ever contributed so much to the prosperity of France.

Colchis (kōl'kĭs), ancient province of Asia; bounded on the N. by the Caucasus, S. by Armenia, W. by the Pontus Euxinus (Black Sea); celebrated in ancient fable and poetry as the place to which the Argonauts sailed for the golden fleece, and as the home of Medea; was noted for its wines and fruits, and was the native country of the pheasant, which derived its name from Phasis, a river of Colchis; is now part of the Russian dominions.

Cold, absence of heat. At various times physicists have sought for the greatest cold, and in the older literature one meets with various freezing mixtures which were supposed to produce the lowest possible temperature. More recently, however, the matter has been put upon a scientific basis, and we may now speak of absolute cold. According to the modern dynamic theory heat (*q.v.*) is a mode of motion, the molecules of which any body is composed being in constant vibration; and the more rapid this molecular vibration, the warm-

er the body; the slower they become, the colder it is. In this way we can conceive a condition at which this molecular vibration should cease, and this would be the absolute cold or absolute zero. This point is readily computed, and is 273° of the centigrade scale below the freezing point of water, or 459.4° below zero by the Fahrenheit thermometer. The greatest degree of cold as yet obtained is about — 200° C. (about 330° below zero Fahrenheit) by boiling liquid oxygen under reduced pressure. There are certain degrees of cold below which life cannot exist. These limits vary widely, and death from cold may be produced in several ways. Thus in man death occurs by a retardation of the circulation and a slowing of the action of the heart accompanied by loss of heat, until respiration and circulation cease and death supervenes, and this may occur, as in the case of persons long immersed in cold water, without the lowering of the temperature to freezing. On the other hand, many animals and plants flourish in the Arctic seas, and some forms can withstand an even greater extreme than this.

Cold Cream, a toilet preparation used for softening and cooling the skin. One formula is:

Spermaceti	125 parts
White wax	120 "
Expressed oil of almonds	600 "
Rose water	190 "
Sodium borate	5 "

The solids are melted and mixed with the oil, and after straining and stirring the rose water is slowly added.

Cold Har'bor, locality in Hanover Co., Va.; 10 m. NE. of Richmond; scene of two battles in the Civil War. The first, June 17, 1862, better known as the battle of Gaine's Mill (*q.v.*). The second, June 3, 1864, was an attack on intrenchments held by 50,000 to 69,000 Confederate troops under Lee by 150,000 troops under Grant. In this attack, which lasted only about half an hour, the total Federal loss was 12,738; the Confederate loss was very small. After his repulse Grant retreated across the Chickahominy and James, and took up his position near Petersburg.

Cold Stor'age. See REFRIGERATION.

Cold'stream, border town of Berwickshire, Scotland; on the Tweed; 15 m. SW. of Berwick. Before the Reformation it was the seat of a priory famous as the place where, in the reign of Henry VIII, the papal legate issued a bull against the printing of the Bible. Near this place is the famous ford where the English and Scottish armies formerly crossed the Tweed. Here Gen. Monk raised the regiment still known as the Coldstream Guards. Pop. (1901) 1,482.

Cold Wave, a sudden, general fall of temperature coming from a cold region over a warmer one. In the E. U. S., cold waves from the N. plains often cause a fall of 18° F. or more, and lower the temperature to or below freezing. They usually cross the border of the U. S. between Lake Superior and the Rocky Mountains, and spread E.; sometimes also SE. or S. They usually follow sharply on a winter storm, and rarely continue more than two or three days; they are successfully forecasted by the Weather Bureau.

Colen'so, John William, 1814–83; English prelate; b. St. Austell, Cornwall; Bishop of Natal, S. Africa, 1853–64; deposed for statements concerning Moses and his denial of the inspiration of the Old Testament, contained in his "The Pentateuch"; proceeding later pronounced null and void; espoused the cause of the Zulus, and secured the sending of Cetewayo (*q.v.*) to England.

Coleoptera (kō-lē-ŏp'tē-rā), the order of insects including beetles; distinguished by thickened horny anterior wings, *elytra,* which meet in a straight line down the back and conceal the second membranous pair of wings, the true organs of flight. See BEETLE.

Cole'ridge, John Duke (Lord), 1821–94; English jurist; b. London; son of John Taylor Coleridge; called to the bar at the Middle Temple, 1846; Recorder of Portsmouth, 1855; Queen's Counsel, 1861; Attorney-General, 1871; Lord Chief Justice of the Court of Common Pleas, 1873, and Lord Chief Justice of England, 1880; created Baron Coleridge of Ottery St. Mary, 1873.

Coleridge, Samuel Taylor, 1772–1834; b. Ottery St. Mary; son of the vicar of that parish; resided at Nether Stowey, Somerset, 1795–98, and there composed "The Ancient Mariner," and with Wordsworth wrote "Lyrical Ballads"; preached in Unitarian churches; in 1798 visited Germany with Wordsworth and studied at Göttingen; removed, 1801, to Keswick, Cumberland, residing with Southey and Wordsworth, the trio being classed by unfriendly critics of the reviews as "The Lake Poets"; in 1809 began the publication of *The Friend,* a periodical; led a wandering life and became addicted to opium; resided in London chiefly, after 1816; introduced to English readers some of the valuable points of German philosophy; his "Aids to Reflection" stimulated a profounder method of thinking in England and the U. S.; other works "Christabel," "Zapolya," and "Remorse," tragedies; and "Biographia Literaria."

Col'et, John, 1466–1519; English theologian; b. London; was successively Prebendary of York and Dean of St. Paul's; founded and endowed St. Paul's School, London, the first in England in which Greek became a regular part of the curriculum; with William Lily compiled a famous Latin grammar; and is credited with having contributed through his lectures to the Reformation.

Col'fax, Schuyler, 1823–85; American statesman; b. New York City; proprietor and editor of the South Bend (Ind.) *Register,* 1845–63; delegate to Whig conventions, 1848 and 1852; member of Congress, 1854–69, and three times Speaker; elected Vice President of the U. S. with Grant, 1868; served to end of

term; was accused of corruption in connection with the Credit Mobilier scandal, 1873, unjustly, as he and his friends claimed; retired from public life and engaged in manufacturing; founded the Daughters of Rebekah, a branch of Odd Fellowship.

Coligny (kŏ-lēn-yē'), **Gaspard de Châtillon** (Count), 1517–72; French admiral and Huguenot; b. Châtillon-sur-Loing; admiral of France, 1552; second in command of the Protestant army in the civil war which began, 1562; when the Prince of Condé was killed at Jarnac, 1569, succeeded him as commander in chief; went to Paris to attend the marriage of Henry of Navarre, 1572, and was received with feigned kindness by Charles IX; was wounded in the street by a partisan of the Duke of Guise, and killed, two days later, in the massacre of St. Bartholomew.

Colise'um, or Colosse'um, an immense amphitheater in Rome, the largest permanent structure of the kind ever built. It was begun by Vespasian, built by him as far as the top of the third row of arches, and finished by his son, Titus, by whom it was dedicated in 80 A.D., with games, gladiatorial shows, and scenic exhibitions of unprecedented splendor. The building, which covers nearly five acres, and in its complete state had accommodation for 80,000 spectators, is in the form of an ellipse; its longer diameter is 615 ft., its shorter, 510; the height of its outer wall is 164 ft. The arena within is 281 ft. in length and 176 in breadth. The exterior wall of the edifice consists of four stories, of three different orders of architecture; the lowest is Doric, the second Ionic, the third and fourth Corinthian. The part of the Coliseum designed for spectators is in its leading features arranged like that in other ancient structures of the same design (see AMPHITHEATER). The best-known events in the history of the Coliseum are those connected with the history of the Christian Church. Many of the early Christians suffered martyrdom in its arena. A cross now stands in the center of the arena, erected in memory of their martyrdom. The building is supposed to have remained entire until Rome was invaded by Robert Guiscard, who began its demolition in 1084 to prevent its being used as a fortress. After the fourteenth century it began to be despoiled by the great Roman families, who used its stone to build their palaces.



THE COLISEUM.

Col'lar-bone. See CLAVICLE.

Col'lege, originally a body of persons associated for the performance of common functions; a body of colleagues. Under Roman law there were the colleges of augurs, of pontiffs, of tribunes, and of artisans. In mediæval and modern times applied to bodies quite dissimilar in purposes. Thus the college of bishops, the college of cardinals, and the college of presidential electors; but it is in educational matters that the term has come to have the most marked significance. It is probable that colleges organized for academic purposes had their origin about the end of the twelfth century at the Univ. of Paris, where persons who had common ends in view associated themselves together for a mutual advantage. A little later the term was applied to institutions of learning in other countries. In the thirteenth century many colleges were established at Oxford and Cambridge; and were bound together in what we know as the university. As time passed on the aggregation of students in buildings where they could at once advance their common interests and receive protection in their common and personal rights was encouraged. In this way the group of buildings known as the colleges at Oxford

and Cambridge came into existence. In England students offering themselves for degrees were examined for the most part either in the ancient classics or in mathematics. This fact gave great preponderance to those studies. The same was true in the colleges of the U. S. that were organized on the English model. In 1852 the College of Literature, Science, and the Arts of the Univ. of Michigan was remodeled on the theory that science, the modern languages, and history were entitled to the same prominence in the curriculum as ancient languages and mathematics to justify the change. The spirit which led to this change in a few years greatly modified the colleges that had been established on the old model. Technical studies also pressed for recognition. Colleges of engineering, agriculture, and architecture were established. Some of these formed a part of institutions already established, and some were established on an independent basis. The natural consequence of this movement was that great variety ensued. There is therefore a marked absence of uniformity both in the requirements for admission to colleges and in the studies pursued by collegiate students. In general it may be said, however, that the requirements for admission have been steadily increased, and that the average age at which students are now admitted to college is about two years older than it was about the middle of the nineteenth century. Meantime the number of colleges has multiplied even more rapidly than the population of the country.

In some parts of the country there are special colleges for the higher education of women, in other parts the women are admitted to the same colleges and on equal terms with the men or in separate colleges which are affiliated with older institutions for men. Coeducation obtains, generally speaking, in the middle and W. states. The Univ. of Iowa opened its doors to women on equal terms with men, 1860, and the example was rapidly followed by Michigan and other state universities. The Leland Stanford, Jr., Univ., opened in 1891, and the Univ. of Chicago, opened 1892, were organized with the same advantages for women as for men. In the East and South women are usually educated in separate colleges, where they live for the most part in buildings provided by the college corporation. Such colleges are Bryn Mawr, Mt. Holyoke, Smith, Vassar, and Wellesley. Barnard College, in New York City, and Radcliffe, in Cambridge, Mass., are associated respectively with Columbia and Harvard univs., from which their teaching forces are drawn. Their degrees are also signed by the presidents of the universities. At Oxford and Cambridge, England, there are colleges for women. Of the few European institutions in which higher degrees are given to women on the same conditions as men, the Univ. of Zurich, in Switzerland, is the best known. See BUSINESS COLLEGE; EDUCATION; UNIVERSITY.

College Frater'nities, class of organizations prevalent among the students of the higher institutions of learning in the U. S. With one exception they are secret in character, though this element is in reality a mere concession to the youthful love of the mysterious. They are composed of branches called "chapters." A fraternity has only one chapter in any one college. The names of many of the fraternities are composed of Greek letters, and they are hence called "Greek letter societies." The chapters also bear Greek names, sometimes in the regular order of the dates of their establishment, sometimes with the name of the state added, and sometimes they are named from the colleges or towns in which they are located. The first society bearing a Greek name was the *Phi Beta Kappa,* founded at the College of William and Mary, Virginia, 1776. It was social and secret. In 1779 it authorized the establishment of branches at Yale and Harvard, and the next year ceased to exist, on account of the confusion incident to the Revolution. The chapter at Yale was established, 1780, and that at Harvard, 1781, these two chapters afterwards uniting to establish branches elsewhere. This society became a literary organization; admitting members from the higher classes only, it gradually grew formal and perfunctory, its ritual and so-called secrets were disclosed, and finally admission to its ranks was based entirely upon grounds of scholarship, and after a time its honored badge became simply a symbol of high collegiate rank. It was revived, 1881, but still remains an honorary society. In 1825 the first of the men's general fraternities, the *Kappa Alpha,* was formed at Union College. In external features it closely copied *Phi Beta Kappa.*

In 1827 two other societies of the same nature, *Sigma Phi* and *Delta Phi,* were founded at Union. In 1831 *Sigma Phi* placed a chapter at Hamilton College, and this resulted in the formation there, 1832, of a rival society, called *Alpha Delta Phi.* So the system spread, the establishment of a chapter at a college leading soon to the organization of a rival society or chapter. A fraternity confined exclusively to technical institutions, *Tau Beta Pi,* was founded at Lehigh Univ., 1885. Since abt. 1870 the weak system of government among the fraternities has changed into one composed of a legislative body, or convention of chapter delegates, meeting regularly, its sessions being accompanied by public exercises and a banquet, and an administrative body composed of an executive, usually called a president, and assisted by a board of trustees and several minor officials with limited jurisdiction. The aims of the majority of the chapters are purely social. A great amount of literature is published by the various fraternities, including catalogues and song books. Many of the chapter houses have been erected with a lavish expenditure of money. Fraternities exist in many women's colleges.

College of New Jer'sey. See PRINCETON UNIVERSITY.

Col'leton, James, colonial Governor of S. Carolina; appointed in the interests of the proprietaries, with the rank of landgrave, 1686; endeavored to enforce the laws in the constitutions which the colonists refused to recog-

nize as binding; met with bitter opposition from the majority of the colonial parliament, and excluded them from their seats. In 1687 a new parliament was elected, and in 1690 he was impeached, disfranchised, and banished.

Col'lie, a breed of dog of Scotch origin of high intelligence and affection, used for guarding sheep. It is one of the most sagacious and docile of dogs. The points of a good Scotch collie are: a long, narrow head, small semierect ears set high on the head; long straight forelegs, well under the body. It has a close undercoat of fur, covered with straight stiff hair, which is usually black and white and tan in color. The height is about 22 in.

Col'lieries. See MINING.

Collima'tion, Line of, in astronomy, the central axis of a telescope, or the line passing through the center of the object glass and the center of the eye piece when the latter is in some standard position. In the case of the transit instrument, the line of collimation is defined as that which passes through the optical center at right angles to the axis on which the instrument turns. In the case of a telescope furnished with a revolving micrometer and position circle, the line of collimation is that which passes through the center of the object glass and the center of revolution of the micrometer.

Col'limator, fixed telescope, used to adjust another telescope; the invention of David Rittenhouse. The peculiar feature of the collimator is that it is not mainly used to look through, but that light is sent through it in the reverse of the usual direction so that rays emanating from a point in its focus are parallel after they emerge from the objective.

Col'lingwood, Cuthbert (Lord), 1750–1810; English naval officer; b. Newcastle-upon-Tyne; entered the navy, 1761; followed Admiral Graves to America, 1774; was made lieutenant after the battle of Bunker Hill; took part in the naval victory which Lord Howe gained over the French, 1794; rendered important services at the battle off Cape St. Vincent, 1797; was the second in command at the battle of Trafalgar, 1805, and the chief command devolved on him before the end of the action by the death of Nelson; for his part in this victory was raised to the peerage.

Col'lins, William, 1721–59; English lyric poet; b. Chichester; educated at Oxford. He became a resident of London, 1744, and was a friend of Dr. Johnson. He produced in 1747 an admirable ode on "The Passions," and lyric poems, among which are odes to Mercy and Evening, etc. He was subject to melancholy, and was confined in an asylum in the latter part of his life.

Collins, William Wilkie, 1824–89; English novelist; b. London; published a number of novels which became very popular. They include "Antonina," "Basil," "The Dead Secret," "Woman in White," "Armadale," "Man and Wife," "No Name," "The Moonstone," "Poor Miss Finch," "The New Magdalen"; also wrote "The Lighthouse" and "The Frozen Deep," dramas. Noted for his ability to maintain the plot interest in his stories.

Colli'sion (in maritime law). See ROAD, LAW OF THE.

Collo'dion, or Collo'dium, a clear, colorless, gummy liquid, consisting of pyroxylin or guncotton dissolved in a mixture of alcohol and ether; is used in photography; also in surgery for covering wounds.

Collot-d'Herbois (kŏl-lō'-dăr-bwä'), **Jean Marie,** 1750–96; French Jacobin; b. Paris; originally a strolling player; a member of the convention, and a partisan of Robespierre, notorious for his violence and cruelty; became a member of the committee of public safety, 1793, and was sent to Lyons, where he caused hundreds to be put to death; in the crisis of the ninth Thermidor, 1794, acted with the enemies of Robespierre; in 1795 was transported to Cayenne, where he died.

Col'ocynth, fruit of *Citrullus colocynthis,* a plant with a perennial root and hairy, many-lobed leaves; said to be indigenous to Japan, but found largely throughout W. Asia and Greece and in the neighborhood of the Cape of

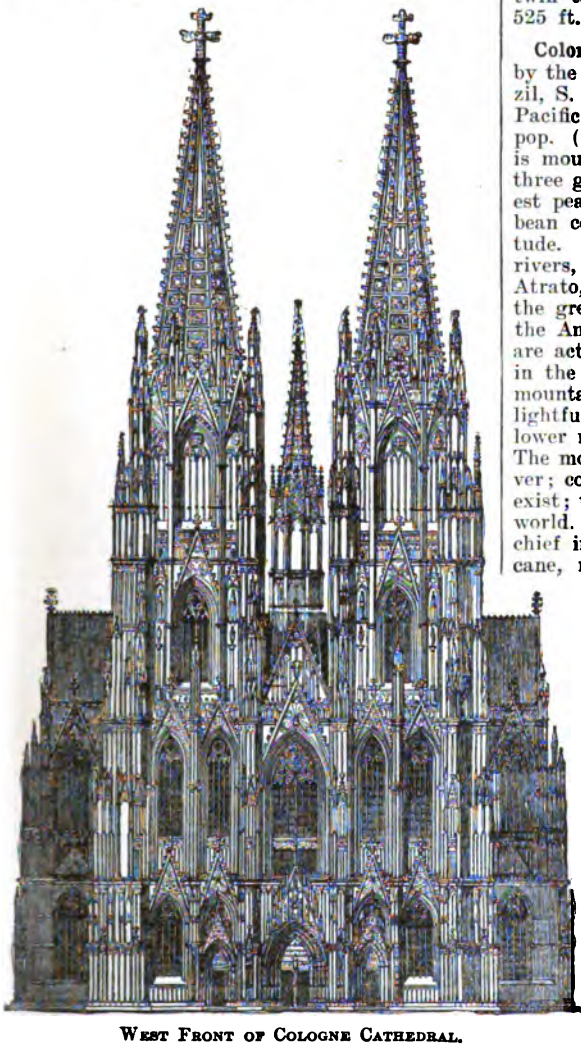


COLOCYNTH.

Good Hope. It is also cultivated in Spain. A preparation of the pulp of the fruit combined with powdered gum acacia is used in medicine as a powerful purgative, and in cases of melancholia depending on torpor of the liver. It irritates the intestine, and overdoses have been fatal.

Cologne (kō-lōn'), German KÖLN, fortified city of Prussia; the capital of the province of Rhenish Prussia; on the Rhine, 24 m. SE. of Düsseldorf. It is at the intersection of several railways, and is connected with Deutz by a handsome iron bridge. Cologne is a fortress of the first rank; is noted for its churches, chief of which is the cathedral, the largest specimen of Gothic architecture in the world; begun 1248, completed 1880. It is in the form of a cross, 510 ft. long and 231 ft. wide, with twin towers attaining the height of 525 ft. St. Ur-

sula's Church contains the bones of eleven thousand virgins massacred by the Huns. Cologne has manufactures of silk and woolen fabrics, cotton yarn, velvet, hosiery, lace, hats, thread, clocks, and *eau de cologne*. It derives much prosperity from the navigation of the Rhine, and has trade in grain, wine, oil, etc. Cologne originated from the Roman colony planted on that spot by Claudius, 51 A.D., and called in honor of his wife, Colonia Agrippina. It was annexed to the German Empire in 870 A.D., and became one of the most populous and wealthy cities of the Hanseatic League. The archbishops of Cologne were princes and electors of the German Empire during several centuries. Pop. (1900) 372,529.



WEST FRONT OF COLOGNE CATHEDRAL.

Cologne Cathe'dral, the largest specimen of Gothic architecture in the world; situated in Cologne, Germany. The cathedral was begun by Gerhard under Archbishop Konrad, of Hochstaden, in 1248. The work progressed slowly through centuries, being retarded by the Reformation. Early in the nineteenth century the Germans, moved by national enthusiasm, raised large sums of money for the repair and completion of the work. The completion of the cathedral (1880) was an event of world-wide interest. The structure is in the form of a cross, 510 ft. long and 231 ft. wide, with twin towers in front attaining the height of 525 ft.

Colom'bia, S. American republic; bounded N. by the Caribbean Sea, E. by Venezuela and Brazil, S. by Brazil and Ecuador, and W. by the Pacific; area about 473,000 sq. m.; estimated pop. (1905) 3,917,000. Much of the surface is mountainous, the Andes here dividing into three great branches or Cordilleras. The highest peak, Tolima, is 18,426 ft. On the Caribbean coast is an isolated range of great altitude. There are also extensive plateaus; chief rivers, all flowing into the Caribbean Sea, the Atrato, Cauca, and Magdalena, the last named the great interior highway. Two branches of the Amazon rise in E. Colombia. In the SE. are active volcanoes; earthquakes are frequent in the mountain regions. The climate of the mountain flanks and central plateaus is delightful; that of the coasts, lower plains, and lower river valleys, hot, damp, and unhealthy. The mountain regions are rich in gold and silver; copper, lead, platinum, coal, and rock salt exist; the emerald mines are the richest in the world. Agriculture and stock raising are the chief industries. Coffee, tobacco, cacao, sugar cane, maize, manioc, and plantains are produced. Coarse cotton and woolen cloths, unrefined sugar, molasses and rum, cigars, leather work, furniture, and hats are about the only manufactures. The largest export trade is with the U. S.; largest import trade with Great Britain; chief exports, coffee, gold, silver, cattle, hides, quinine, tobacco, cacao, India rubber, cabinet and dye woods. There are few railroads.

Three fourths of the people are of Indian or mixed race. Spanish is the universal language, except with uncivilized Indians. Chief towns, Bogota, the capital; Barranquilla, the chief port; Medellin, Bucaramanga, Cali, and Cartagena. Colombia is a centralized republic, resembling France in theory. There are eight departments. The state religion is Roman Catholic, but all denominations are tolerated. The system of public education is good; there are three universities, and several normal schools, seminaries, etc. Darien was founded by the Spaniards, 1510; the Indian natives of the country were subdued before 1600. The vice royalty of New Granada was founded, 1740. Having obtained its independence, 1819, New Granada united with Venezuela as the republic of Colombia, to which Ecuador was annexed soon after. This union was dissolved, 1831, and the republic of New Granada formed. In 1861 a Federal constitution was adopted, and the country became

the United States of Colombia. In 1903 the department of Panama became independent as a separate republic.

Colom'bo, fortified seaport and capital of Ceylon; on its W. coast; near a rocky headland, the *Jovis extremum* of Ptolemy; harbor small, and only safe during the SE. monsoon. Most of the foreign trade of Ceylon is transacted at this port. It was occupied by the Portuguese, 1517, taken by the Dutch, 1603, and conquered, 1796, by the British, who still possess it. Pop. (1901) 158,228.

Colon', formerly ASPINWALL, seaport of the republic of Panama; at the Atlantic extremity of the Panama Canal, and of the Panama Railroad; on the island of Manzanilla, a low-lying area of coral formation, in Simon Bay; 8 m. NE. of the old Spanish port of Chagres; 47 m. NW. of Panama, and equidistant from Valparaiso and San Francisco. It is divided into three sections—the railroad quarter, the native quarter, and Cristobal Colon Point. In the first are the residences of the consuls, the offices of the steamship companies, a hotel owned by the railroad company, and an Episcopal church. On the Point stands a statue of Columbus, presented by the Empress Eugénie. Colon has no industries and but little local trade, but an increasingly important commerce, no less than five hundred ships visiting the port annually, including the steamships of seven European and U. S. companies. The imports are chiefly from the U. S. Colon was founded, 1855; long called Aspinwall, after the founder of the Panama Railroad; was twice burned. Pop. abt. 4,500.

Co'lon, that part of the large intestine which leads from the cæcum to the rectum. In the adult human it is about 4½ ft. long. The colon, owing to the peculiar arrangement of its muscular fibers, consists of a series of pouches which serve to detain the contents of the intestines on their way to the rectum. It has numerous glands, and the power to some extent of digesting food.

Colonel (kėr'nĕl), military title formerly applied to the chief of a body of men varying in size from a band of partisans to a brigade or division. For many years it has been restricted to the commander of a regiment whose rank is next below that of a brigadier general. With the modern organization of regiments into battalions commanded by majors, the personal presence and voice of the colonel can no longer direct all the men of the regiment, and his command on the field assimilates more nearly to that held by a brigadier general. As the regiment is still the administrative and historical unit, however, he retains his position as its responsible head, and is permanently attached to it.

Colo'nial Con'gress, First, the congress held in the city of New York in May, 1690. Immediately after the attack on Schenectady the government of Massachusetts sent a circular letter to all the colonies as far S. as Maryland, inviting them to send commissioners to New York to adopt some common plan of defense; and the congress, consisting of delegates from Massachusetts, Connecticut, and New York, planned the campaign against Canada.

Colonial Sys'tem, restriction of trade between a mother country and its colonies to the ships, agencies, and channels of that nationality only. This policy was formerly thought to bind the colony closer to its parent; to keep in their hands jointly all the profits of their commercial intercourse; also to build up a commercial marine as a reservoir for ships and men in time of war. Unrestricted trade between all countries has long since done away with the colonial system, though perhaps the policy of permitting the coasting trade of a country to be engaged in only by its ships is a survival of its spirit.

Colon'na, celebrated noble and powerful Roman family which produced many generals, ecclesiastics, cardinals, and authors; acquired distinction as early as the twelfth century. In the succeeding centuries they were adherents of the Ghibelline party. Otho Colonna was elected pope, 1417.

Colonna, Vittoria, 1490–1547; Italian poet; daughter of the grand constable of Naples; made an early marriage, 1509, with Ferrante d'Avalos, Marquis of Pescara, who became later one of the most noted soldiers of his time. Her earlier poetry was the outcome of love and admiration for a husband who had little affection to give her in return, and who had a character of very mixed quality. Nevertheless, after his death, 1525, she idealized him in ardent lyrics. Later religious impulses acquired ascendency over her, and her "Rime Spirituali" constitute perhaps the most important part of her poetical achievement.

Colonnade', a row of columns with all that goes with them, as the entablature above, the stylobate (if any) below, sometimes the space inclosed behind them, with its roof, etc.

Col'ony, foreign settlement formed by emigrants under the protection or control of the mother country. The term is no longer limited to its original meaning of a body of farmers or cultivators (*coloni*), but includes any group of settlers whatever be their purpose, so long as they remain in political dependence upon the home country, and it is sometimes loosely applied to such a settlement even after the tie between it and the parent state is broken. The chief colonizing nations of antiquity were the Phœnicians, Carthaginians, Greeks, and Romans. With Rome colonization was a part of her system of universal dominion, the means by which she Romanized her conquered provinces and fused them into an empire. From the fall of Rome to the end of the Dark Ages no colonies in the proper sense of the word were established. With the rise of the Italian cities colonization was renewed, and Venice and Genoa owed their main strength to their colonies in the Levant. After the voyages of Columbus and Da Gama, the nations of W. Europe took the lead in colonization. In the sixteenth century Spain's colonial dominion was the greatest in the world, and she herself the wealthiest nation. Great Britain, after driving the French and the Dutch from India,

and the French from Canada, 1763, succeeded to her place, becoming, as she has since remained, the greatest colonial empire in the world.

Col'ophon, ancient Greek city of Ionia, in Asia Minor; on the Ales or Halesus River; 9 m. N. of Ephesus; one of the seven cities which claimed the honor of being the native place of Homer.

Colophon, inscription, monogram, or other design placed on the last page of a book. The colophon formerly gave the date, printer's name, etc., with much of the information now conveyed on the title page.

Col'or, property of objects, distinguished only by the sense of sight. The structure of the eye and of the elaborate nervous system connected with it enables us to distinguish form and degrees of light and shade, and in addition to these to recognize differences in the quality of the light. This power of distinguishing between kinds of light constitutes the color sense.

Complicated as color effects at first appear to be, they can all be explained as the resultant of three primary color sensations: the sense of red, green, and violet. It is assumed that there is a triple mechanism in the eye, by which these three fundamental sensations are received and transmitted to the brain. The absence of one of them, usually that of red or green, constitutes "color-blindness" or Daltonism. The color-blind eye, then, possesses a color system which depends upon two, the normal eye a system which involves three, primary sensations.

Whenever, in the case of the normal eye, all three primary impressions are produced in equal strength, the resultant is white. All other colors differ from white simply in the relative strength of the three components.

The entire group of light waves which affect the retina are comprised within a single octave, so that the range of sensibility of the eye may be said to be less than that of the ear. Within that narrow range, however, at least one thousand simple tints are distinguishable. These may be taken in combination with each other and with white, the total number of distinct color impressions thus capable of being formed being very large (according to Rood, about two millions). The chief source of color in objects is the selective absorption of the different wave lengths of light by the substances. A simple monochromatic tint is produced by some ray of single-wave length. Such are the colors of the pure spectrum. The colors of the spectrum, however, are not simple, from the physiological point of view, since each separate wave length of the visible spectrum excites, in some degree, all three of the primary color sensations, so that the resulting impression is of the same degree of complexity as that due to sunlight or to any ordinary source. A body which would reflect all rays would be pure white; one which would absorb all rays would be pure black. No known body has these qualities, as even the darkest lampblack reflects about three per cent of the light falling upon it. See COMPLEMENTARY COLORS, LIGHT, etc.

Next to selective absorption, and scarcely secondary to it as a source of color, is diffraction. To the class of diffraction colors belong the tints of the bubble and of all thin films, the colors of mother of pearl, of the brilliant tropical beetles, and much of the coloring in insect life; also the hues of the plumage of the humming bird, and, indeed, all those colors to which the term "iridescent" may be applied. Color in these cases is due to interference of the light rays reflected from the surfaces.

Colora'do, called the CENTENNIAL STATE, because admitted into the Union 1876; state flower, columbine; state in the W. division of the N. American Union; length from N. to S., 280 m.; width, 370 m.; area, 103,925 sq. m.; pop. (1900) 539,700; capital, Denver. The E. third of the state is a lofty plateau, rising at the foothills of the Rocky Mountains to 6,000–



7,000 ft. The Rocky Mountains and their parks and the valleys beyond occupy the rest of the state. The parks are broad valleys, originally beds of inland lakes. There are forty peaks over 14,000 ft.; the highest is Sierra Blanca, 14,483 ft. The rivers are the N. Fork of Platte, South Platte, Republican, Arkansas, Rio Grande, San Juan, Gunnison, Grand, White, Green, and their affluents; none navigable. The cañons of the Arkansas, Rio Grande, San Juan, Gunnison, Grand, and Green are from 2,000 to 5,000 ft. deep, and of wonderful and terrible magnificence. Gold and silver are found in about two thirds of the counties of the state; copper alone and with gold, lead alone and with silver and gold, zinc alone and with silver, iron with gold and alone in great quantities; platina, quicksilver, tellurium in combination with gold, silver, and copper; coal, both bituminous and anthracite; petroleum, gypsum, salt, kaolin, pottery clays, and precious stones. The arable lands comprise 15,000 m. or more of its area, and the grazing lands at least 70,000 m. or more. The arable lands are generally fertile but most of them require irrigation.

Wild animals include the grizzly bear W. of Rocky Mountains, the black and brown bear and the jaguar in the W., the cougar in the NW., the gray wolf E. and W., the prairie wolf E. of Rocky Mountains.

Owing to the general elevation, the climate is temperate; rather too cool than too hot. Agriculture, especially in the NE. part of the state, and cattle herding and sheep raising are important industries. Staple products: wheat, corn, oats, barley, rye, potatoes, hay, sugar beets. Fruit culture is extensively carried on, and dairy farming yields large returns. The mining, smelting, and reducing of metals have made the state prominent. Colorado leads the states in the production of gold, is second in the production of silver, fifth in that of coal, and sixth in that of copper. Manufacturing in 1900 comprised 3,570 industries; establishments, 1905, 1,606; capital, $107,663,500; value of products, $100,143,999. There is an excellent public-school system; graded and high schools in the larger towns, a state university at Boulder, a college at Colorado Springs, a state agricultural college at Fort Collins, state school of mines at Golden. The leading denominations are the Roman Catholic, Methodist, and Presbyterian. Civilized Cherokees attempted to explore Colorado, 1857, but were driven back by other Indians. In 1858 it was explored at two points, and gold found. In 1859, Clear Creek gold deposits were discovered; great immigration, 1859; territory organized, 1861; attempts made for its admission as a state, 1865–67; vetoed by President Johnson, and, 1873, denied by Congress; admitted, 1876, and, soon after, great discoveries of carbonates of lead and silver in Lake Co. turned the tide of immigration to the new state.

Colorado Des'ert, arid basin traversed by the S. Pacific Railroad between Fort Yuma and San Bernardino. Its principal depression is also called the Coahuila Valley, and its E. continuation is the Yuma Desert. The lower part of the Coahuila Valley, including about 17,000 sq. m., lies below the level of the ocean. It was formerly part of the Gulf of California, but in prehistoric times was separated therefrom by the growth of the delta of the Colorado River, which gradually extended from E. to W. until it joined the peninsula of Lower California, and thus shut out the sea. Since the occupation of the country by white men the river has occasionally, during high flood, discharged a portion of its water toward the Coahuila Valley by a channel called New River, and in 1891 such a discharge produced in the bottom of the valley a broad but shallow lake known as Salton Lake, or Salton Sink.

Colorado, Ri'o, river in the S. of Argentina, rising in the Andes and flowing ESE. to the Atlantic near lat. 39° 50′ S.; is formed by the junction of the Barrancas and Rio Grande, and the length from the source of the latter is 620 m. It is navigable about 200 m. for vessels drawing 7 ft. The Colorado separates the Argentine territories of Pampa and Rio Negro.

Colorado Riv'er (of the West), drains a large plateau and mountain area of Wyoming, Colorado, Utah, and Arizona; formed in SE. Utah, by the junction of Green River, 450 m. long, from Wyoming, and the Grand River, about 350 m. long, from Colorado. Below the junction the Colorado erodes the plateaus of SE. Utah and N. Arizona for 180 m., passing through the Marble Canyon in Arizona, 3,600 ft. deep, before receiving the Little Colorado, which comes from the SE., through a canyon in E. Arizona. After an irregular course of 180 m. through the Grand Canyon, it forms the W. boundary of Arizona to the entrance of the Gila River at Yuma, and thence in Mexico 70 m. across its delta to the Gulf of California. The diversion of a portion of its waters into the Coahuila Valley, California, has frequently occurred. See COLORADO DESERT.

Also name of a river of Texas; rises in the high table-lands in NW. Texas. Its general direction is SE.; length abt. 850 m. Steamboats can ascend it above Austin.

Colorado Springs, capital El Paso Co., Col.; 75 m. S. of Denver; near the foot of Pike's Peak and the mouth of the Ute Pass; surrounded by magnificent scenery; seat of Colorado College, the State Institution for Deaf-Mutes, the Childs-Drexel Printers' Home, St. Francis Hospital, and several sanitariums; and is a popular health resort, owing to its proximity to the Manitou mineral springs and the dryness of the air. Pop. (1900) 21,085.

Color-blind'ness, defect in vision, depending on a want of sensibility in the eye, or perceptive capacity in the brain, so that certain colors are not distinguished, or all colors are alike invisible as such. In red blindness, that color is perceived as yellow, and in green blindness the green usually also appears as yellow. These defects may be produced by straining the eyes, as in the case of railroad workers who have to distinguish colored signals at great distances. It is believed that attention was first called to this defect by the publication of the particulars of his own case, by Dr. John Dalton, 1794, and it has therefore been called Daltonism. Color blindness is detected by the use of a proper selection of colored worsteds.

Color Photog'raphy. See PHOTOGRAPHY, COLOR.

Color Print'ing, art of producing pictures, book illustrations, cards, "posters," etc., in colors, by lithography, printing from zinc or copper plates, etc. When lithography is employed a separate stone for each color is necessary, and frequently as many as thirty printings are required. The earliest color printing in England was produced abt. 1486, wood blocks being used. Most modern color printing is accomplished by photographing the picture to be reproduced in such a way as to obtain three negatives. These negatives respectively represent shades of red, yellow, and blue, which, combined in the original picture, make up all the colors shown. The negatives are transformed into corresponding half-tone plates, each of which is inked to print its color. When printed over each other, the three colors combine to give all the shades and gradations of color found in the original. See LITHOGRAPHY; THREE-COLOR PRINTING.

Colors, Acciden'tal, colors depending on the momentary fatigue of a portion of the retina for any color to which it has been exposed. Neutral surfaces then appear of a shade complementary to that which produced the fatigue. If we look for a short time steadily with one eye upon any bright-colored spot, as a wafer on a sheet of white paper, and immediately after turn the same eye to another part of the paper, a similar spot will be seen, but of a different color. If the wafer be red, the imaginary spot will be green; if blue, it will be changed into yellow; the color thus appearing being always what is termed the complementary color of that on which the eye was fixed.

Colos'sæ, ancient city of Asia Minor, in Phrygia, on the Lycus; nearly destroyed by earthquake, 65 A.D. St. Paul's Epistle to the Colossians was addressed, 62 (some say 58–60) A.D., to the believers at Colossæ. Its site is 3 m. N. of the modern Chonas or Khonos.

Colos'sal, in the fine arts, any work remarkable for extraordinary dimensions; especially applied to sculpture. The palaces of Babylon contained statues of great size, and in the temples of India are colossal statues. The Egyptians surpassed the Asiatics in these gigantic monuments, their chief statues of very great size being set against the outer walls of temples and often cut out of the solid rock. The taste for colossal statues prevailed among the Greeks, some of the most notable being the chryselephantine statues. The famous bronze statue of Pallas Athene on the Acropolis at Athens was visible many miles at sea. The principal Roman colossus was the figure of Nero, representing him as the sun god, set up by himself before the Golden House; it was in bronze, the work of Zenodorus; Pliny says it was 110 ft. high. The Colossus of Rhodes was a bronze statue of Apollo, standing near the mouth of the harbor. It was thrown down by an earthquake, 224 B.C.

Colosse'um. See COLISEUM.

Colos'sians, Epis'tle to the, book of the New Testament; written at the same time and place as the Epistles to the Ephesians and Philemon, probably during St. Paul's first imprisonment at Rome, abt. 62 A.D. It seems to be directed against certain Jewish heresies of the Alexandrian or Gnostic type.

Colos'sus. See CHARES.

Colt, Samuel, 1814–62; American inventor; b. Hartford, Conn.; invented a pistol called a revolver, for which he obtained a patent, 1835; began abt. 1848 to make revolvers at Hartford, where he erected an extensive armory.

Colts'foot, English weed of the Composite order, so named because its broad heart-shaped leaves were supposed to resemble the foot of a colt. The leaves were formerly a popular remedy for colds and asthma. The flowers are yellow.

Colu'go. See FLYING LEMUR.

Colum'ba, Saint, called also **Saint Colm,** 521–597 A.D.; Irish missionary; b. probably at Gartan, Co. Donegal; set out on his mission to Scotland, 563; founded in Iona, one of the Hebrides, an abbey and college which had a high reputation.

Colum'ban, or **Colom'ban, Saint,** abt. 543–615; Irish monk; b. in Leinster; founded the monastery of Luxeuil, near Besançon, in France, abt. 590, and was the author of a monastic rule; a man of learning and genius; d. in Bobbio, Italy.

Columba'rium, building for the storage of sepulchral urns containing ashes of the dead. Those known to us are nearly all near Rome. At epochs when bodies of the poor and slaves were burned, columbaria were built to receive their urns.

Colum'bia, capital of S. Carolina and of Richland Co.; on the Congaree River just below the confluence of the Saluda and Broad; 137 m. NNW. of Charleston; seat of the Univ. of S. Carolina, and many educational institutions; industries include cotton mills, railroad shops, woodworking factories, hosiery mills, and fertilizer works. The city was laid out, 1786; taken by Sherman's army, February 17, 1865; and much injured by fire following the burning of cotton stored there, both the citizens and the Federal troops being charged with burning the cotton. Pop. (1906) 24,564.

Columbia, or **Or'egon,** river of the U. S.; largest American river that enters the Pacific; rises on the W. slope of the Rocky Mountains in British Columbia, flows NW. nearly 150 m., and then S. to the State of Washington, in which it unites with a large branch called Clark's River. Below this junction it pursues a very tortuous course to the N. boundary of Oregon. From this point it flows W. in a nearly direct line, and forms the boundary between the States of Oregon and Washington until it enters the Pacific. The tide ascends to the Cascades, a series of rapids, where the river passes through the Cascade Range, 140 m. from its mouth. At the Dalles, Ore., the river is contracted to a channel about 100 yds. wide between basaltic rocks. Entire length, about 1,400 m. A large affluent called Lewis or Snake River, enters it near lat. 46° 20′ N.

Columbia Univer'sity, institution of learning in the city of New York; originally called King's College; chartered by George II, October 31, 1754; first president, Samuel Johnson, D.D. Moneys had been previously raised for it under acts of the colonial assembly authorizing lotteries for the purpose. It received a liberal grant of land from Trinity Church, and on a portion of this its first building was erected. Its original site was in what was later the block bounded by College Place, Barclay, Church, and Murray streets. In 1857 the college was removed to the block bounded by Forty-ninth and Fiftieth streets, Madison and Fourth avenues. In 1892 purchase was made of a plot between 116th and 120th streets, to which the college was removed, 1897. The occurrence of the public troubles which led to the Revolution interfered with the college, and early in 1776 the building was converted into a military hospital, and the students were dis-

persed. In May, 1784, the college, then named Columbia, was placed under the government of a board styled "the regents of the university," and resumed its functions. It was placed under trustees of its own, 1787. A medical faculty was established, 1767, but discontinued, 1813, that the professors might unite with the College of Physicians and Surgeons of New York, then recently organized. A partial union between these two institutions was effected, 1860, and July 1, 1891, the College of Physicians and Surgeons became an integral part of Columbia. James Kent was appointed Professor of Law, 1793, but a law school was not established till 1858. A school of mines was organized, 1864, and has developed into four schools of applied science, *viz.*, mines, chemistry, engineering, architecture, under a faculty of applied science. A school of political science was established, 1880, and an extensive system of post-graduate instruction instituted. In 1890 a school of philosophy was organized, and a school of pure science, 1892. Teachers' College, founded 1888 and chartered by the Regents of the Univ. of the State of New York in 1889, became, in 1898, a part of the educational system of Columbia Univ. In 1900 Barnard College for women became part of the university system. The college was reorganized on the basis of a university, 1890–91, and its segregated parts made into a homogeneous whole. The teaching force numbers five hundred; student body over forty-five hundred.

Colum'biad, seacoast howitzer of cast iron, proposed by Col. George Bomford, chief of ordnance, U. S. A., and introduced abt. 1812. Some of these guns were in service during the war between England and the U. S., 1812–15. Three calibers were recommended—50 pounders, 100 pounders, and 150 pounders—for coast defense, particularly against shipping, as a single shell of the larger sizes would, it was thought, produce great injury, if not complete wreck. The 8-in. howitzer and 10-in. howitzer shell guns were remodeled, 1841 and 1844, intending these last, called *columbiads,* to be fired with solid shot; but they were reserved for shell firing only, and a new pattern was adopted, 1858. The Rodman exterior form of guns was adopted for the columbiads, 1861, and calibers of 13, 15, and 20-in. smooth bore, 10-in. and 12-in. rifled, and 13 and 15 mortars, adopted for seacoast guns.

Colum'bian World's Exposi'tion. See EXPOSITIONS.

Col'umbine, perennial plant of the genus *Aquilegia* of the Crowfoot family. Columbines are so called because their five-spurred petals resemble the shape of pigeons (Lat. *Columba*). The common columbine is cultivated for its showy flowers, being easily raised from seed and thriving in well-drained soil. Several pretty species grow in the Rocky Mountains. With the English poets the columbine was emblematic of forsaken love. In the U. S. columbines are sometimes wrongly called honeysuckles.

Colum'bium. See NIOBIUM.

Colum'bus, Christopher, 1435 or 1436–1506; the discoverer of America; began his nautical career when about fourteen years of age, and appears to have been engaged in commercial voyages in the Mediterranean. Abt. 1470 went to Lisbon, where he supported himself by making maps and charts, and sailed occasionally in expeditions to Guinea. Made a voyage to the NW., 1477, one hundred leagues beyond the "island of Thule," supposed to have been Iceland, as far as lat. 73°. Next he is reported to have visited the Portuguese settlement of San Jorge da Mina, on the coast of Guinea. Having conceived the idea of sailing W. to India by a new route, he began to correspond on this subject, 1474, with Paulo Toscanelli, a cosmographer of Florence, who prepared a map by which Columbus sailed on his first voyage of discovery. Having applied in vain for aid to Genoa, King John II of Portugal, and Ferdinand of Spain, Columbus, undaunted by privations and bitter disappointment, laid his project before Isabella, who exclaimed: "I undertake the enterprise for my own crown of Castile, and will pledge my jewels to raise the necessary funds." The royal documents were signed April 17, 1492, by Ferdinand and Isabella, but the expense was assumed by the latter alone. It was agreed, among other things, that Columbus and his male heirs should have forever the office of admiral over all lands he might discover; that he should be viceroy and governor general; and that he should receive one tenth of all precious stones and metals and merchandise obtained within his jurisdiction. The fleet of three vessels (one commanded by Columbus and two by the Pinzons), with one hundred and twenty men and provisions for one year, sailed from near Palos, August 3, 1492, and, October 12th, reached one of the Bahama Islands, of which he took possession for the crown of Castile, naming it San Salvador. Sailing S. in search of a gold-bearing region, he discovered the islands of Concepcion, Exuma, Isla Larga, Cuba, and Haiti, which last he named Hispaniola. On the bay of Hispaniola, since called Caracola, he built a fort, and, leaving in it thirty-nine men, sailed for Spain, which he reached March, 1493. He was received with boundless enthusiasm and admiration. The Spanish sovereigns placed him in command of seventeen vessels and fifteen hundred men, with which he sailed from Cadiz, September 25, 1493. Having discovered the Caribbean Islands, Jamaica, and Porto Rico, and founded a colony in Hispaniola, of which he left his brother Bartholomew lieutenant governor, he returned to Spain, 1496. Columbus was successful in clearing himself of the clamor which envy had raised against him, and, 1498, sailed with six vessels on his third voyage to the New World. Keeping farther S., he discovered the mouth of the Orinoco, the coast of Para, and the islands of Trinidad, Margarita, and Cubaqua. Then going to Hispaniola, he found the colony disorganized, and in his efforts to restore order became the victim of malice and misrepresentation. With his brother he was put in chains and sent to Spain by the Spanish commissioner, Francisco de Bobadilla, 1500.

Ferdinand disclaimed having authorized this act, but appointed Nicolas Ovando Governor of Hispaniola instead of Columbus, and finally rejected the latter's claims for redress. In 1502 Columbus, in command of four caravels with 150 men, sailed in search of a passage through the Gulf of Mexico to the E. Indies. He coasted along the S. side of the gulf, and after much suffering returned to Spain, 1504, and died in Valladolid.

Columbus, Diego, abt. 1476–1526; Spanish governor; b. probably Lisbon; eldest son of Christopher Columbus; went with his father to Spain, 1484; was a page at court from 1492 till after his father's death; inherited the revenues of Hispaniola; sued King Ferdinand for the titles and powers of which his father had been deprived; won and was confirmed as admiral of the Indies and Governor of Hispaniola; arrived at San Domingo, 1509; ruled with much splendor; sent Velasquez to conquer Cuba; had powers restricted through jealousies at court; recalled to Spain, 1523; spent remainder of life in unsuccessful efforts for redress.

Columbus, capital of Muscogee Co., Ga.; on the Chattahoochee; 100 m. SW. of Macon; popularly known as the "Lowell of the South." In 1905 it had fifty-two factories, with capital of $5,873,851, and products valued at $7,079,702, the chief plants being cotton factories, foundries, and machine shops. Columbus was plotted, 1828; chartered as a city, 1829; occupied by a Union army, April 16, 1865. Pop. (1906) 17,800.

Columbus, capital of Ohio and of Franklin Co.; on both sides of the Scioto; 125 m. NE. of Cincinnati; fourth city of the state in population. In 1905 there were 460 factories, with capital of $30,308,424, and products valued at $40,435,531, largely carriages and wagons. Clearing-house exchanges aggregate $267,940,000 annually. The city has an assessed property valuation exceeding $79,500,000; net debt about $6,500,000. Columbus was laid out, 1812; became the state capital, 1816; chartered as a city, 1834. Pop. (1906) 145,414.

Col'umn, in architecture, a decorated vertical member supporting a lintel or an arch; more slender and ornate than a pier (which is a support composed of built-up masonry or brickwork), and more decorative and important than a pillar or a post (which is a single prop or vertical beam destitute of architectural character). A column consists usually of base, shaft, and capital. The base serves to increase the supporting area under the column, and to mediate between its rigid verticality and the horizontal floor or basement; while the capital, the most ornate portion of all, gathers upon the shaft the various superincumbent pressures, and effects a transition from the vertical lines of the shaft to the horizontal or curved lines of the superstructure. The shaft, usually, but not always, cylindrical, is made up of several sections called drums, or of a single piece, in which case it is called monolithic. Columns have been in all ages erected as monuments, standing isolated in the open, to commemorate important names or events, and in most cases surmounted by statues. The Romans excelled in such monuments, of which the Trajan and Antonine columns at Rome are conspicuous examples, and the Vendôme and July columns in Paris the best modern imitations.

A military formation of relatively great depth and little front is called a column as distinguished from a "line," which has an extended front and little depth. Troops in column are easily moved along roads and over broken country, whereas it is difficult to cause



Column of Trajan.

a deployed line to advance or retire over favorable ground without irregularity or even disruption, and in broken ground it is almost impossible. For this reason lines are always deployed into columns for any extended movement. A column may consist of a company, battalion, regiment, brigade, division, or corps. On marches not in the vicinity of the enemy they usually have a front of four men, great depth, and are composed of all arms. On the battlefield they were formerly much used for the attack with the bayonet, and varied in strength from a single battalion to a large division. In modern fields they seldom exceed a single company, and are used for maneuver only, being deployed into line before they are exposed to fire.

Co'ma, in astronomy, the nebulous envelope of a comet's nucleus. In botany, the name sometimes given to the head or top of a tree, and also to the hairy crest of certain seeds.

The term is also applied to a condition of deep sleep or stupor from which the patient

cannot be aroused; is a symptom of great gravity. Causes include narcosis from alcohol and opium; uræmia, as in Bright's disease; diabetes; apoplexy and injury to the brain; epilepsy; sunstroke and heat exhaustion; pernicious malarial fever; and severe infectious diseases of various kinds. The stuporous condition of extreme drunkenness is the commonest form, but is unfortunately sometimes assumed to be present when the coma is in reality the outcome of some of the other conditions named. See TRANCE.

Coma Bereni'ces (*i.e.*, "Berenice's hair"), a small constellation of the N. hemisphere, between Boötes and the tail of Leo; formed of a cluster of very small stars, which may be seen near the zenith in April and May.

Comanches (kō-măn'chēz), tribe of N. American Indians, belong to the Shoshonean stock; comparatively recent offshoot from the Shoshoni of Wyoming; were found in what is now W. Kansas, 1719; subsequently roamed in Colorado, Kansas, Oklahoma, and Texas; warred with Spaniards in Mexico for two centuries; made first treaty with the U. S., 1835; numbered, 1904, abt. 1,400; at Kiowa Agency, Okla.

Combe (kōm), **Andrew**, 1788–1858; Scottish phrenologist; b. Edinburgh; became a lawyer; converted to Spurzheim's system of phrenology, 1816; delivered many lectures in the U. S., 1838; wrote "System of Phrenology," 1824, and, most important work, "The Constitution of Man," 1828.

Combus'tion, strictly, the process of burning; in widest sense, any chemical act accompanied by an evolution of light and heat, though it generally signifies the act of combining with oxygen. When a substance burns in the air, the act consists in a combination of the substance with oxygen, a new product or new products being formed. Heat and light are results of combination. Why they are caused by the combination we do not know, but we do know that whenever two things combine chemically heat is evolved. Whether light is evolved or not depends on the temperature and the nature of the products formed. If the temperature is high and the product solid, the light is bright. Very few substances combine with oxygen at the ordinary temperature under ordinary conditions. Some substances take fire and burn more easily than others. Some substances combine slowly with oxygen, without evolution of light. The rust on metal is such a slow combination with the oxygen of the air. It has been found, however, that whether a certain substance combines slowly or rapidly with oxygen, the quantity of heat evolved by the combination of a given weight of the substance with oxygen is the same, and that the weight of the ash and gases resulting from the burning is exactly equal to the weight of the substance burned plus the oxygen it has taken up. See OXYGEN.

Com'edy, a species of drama, of which the characteristics in modern usage are that its incidents and language resemble those of ordinary life; that the termination of its intrigue is happy; and that it is distinguished by greater length and greater complexity of plot from the lighter theatrical piece entitled a farce. The original Attic comedy was a burlesque tragedy in form, in substance a satire on individuals, and founded on political or other matters of public interest. The Attic comedies are usually assigned to three schools—the "old," the "middle," and the "new" comedy. The old comedy lasted till the end of the Peloponnesian War. It was characterized by personalities, great freedom and irregularity, and was a powerful political engine. The middle comedy was more finished, less personal and direct in its aims, satirizing systems and opinions rather than individual men; it ceased with the Macedonian conquest. The new comedy was very much like our modern comedy in scope and general character. Among Shakespeare's comedies are: "Comedy of Errors," "Merchant of Venice," "Much Ado About Nothing," "Twelfth Night," "The Tempest," which with Goldsmith's "She Stoops to Conquer," and Sheridan's "The Rivals" and "The School for Scandal," are among the best comedies of English literature.

Comenius (kō-mā'nē-ŏs), **John Amos** (real name, KOMENSKY), 1592–1671; Moravian educational reformer; b. Nivnitz; exiled by persecution of Protestants in Thirty Years' War, became active as a school reformer in Poland, Transylvania, and other countries; may be considered a forerunner of Basedow and Pestalozzi; suggested use of pictures and illustrations to render instruction more attractive; wrote the first pictorial schoolbook, "Orbis Sensualium Pictus," 1657; his "Janua Linguarum Reserata," 1631, and "Pansophiæ Prodronus," 1639, were translated into many languages.

Com'et, a heavenly body of a kind wholly distinct from all others known, and in some points enveloped in a mystery which science has not been able to penetrate. The comets visible to the naked eye consist of three parts: a nucleus, a coma, and a train or tail. The nucleus is a starlike point of light, which in the telescope looks like a small, ill-defined planet. The coma is a cloudy or nebulous light surrounding the nucleus, and growing brighter toward its interior, so that it is difficult to define the exact boundary between the nucleus and the coma. The tail is a train of light, generally fan shaped, more or less curved, and always extending away from the sun. It shades away so gradually toward its end that it is difficult to assign a definite length to it. To the number of comets it is impossible to set any limit. As a general rule, between twenty and forty appear in each century, which are visible to the naked eye. They may therefore, on the average, be expected to appear at intervals of three or four years; but half a dozen or more are found with the telescope nearly every year, the majority of which are new ones. Of those which actually visit the sun, only a very small fraction are ever seen with the telescope, so that we can hardly doubt the soundness of the view of Kepler that the celestial spaces are as full

of comets as the sea of fish. The following is a list of the comets which have been found



The Great Comet of 1811.

to revolve around the sun in periods of less than one hundred years. They are named after their discoverers. The second column gives

LIST OF PERIODIC COMETS.

NAME.	PERIOD (IN YEARS).	LAST OBSERVED PERIHELION PASSAGE.
Encke's	3.3	1905, Jan.
Tempel's II	5.2	1904, Nov.
Barnard's	5.4	1892, Dec.
Brorsen's	5.6	1879, Mar.
Winnecke's	5.6	1898, Mar.
Swift's	5.5	1891, Nov.
Tempel's I	6.0	1898, Oct.
Brooks's	6.3	1896, Nov.
Spitaler's	6.4	1890, Oct.
D'Arrest's	6.7	1897, May
Wolf's	6.7	1898, July
Finlay's	6.7	1900, Feb.
Brooks-Lexell's	7.0	1896, Nov.
Faye's	7.4	1896, Mar.
Tuttle's	13.8	1899, May
Pons's	71.0	1884, Jan.
Olbers's	72.0	1887, Oct.
Halley's	75.0	1909, Sept.

the time of one revolution around the sun; the third, the year and month of the last-observed perihelion passage, or time of arrival at its nearest point to the sun. Several of them were looked for in vain at their last return, and have quite likely ceased to exist, but, as a new one is discovered every two or three years, there is no danger of their becoming extinct. See Asteroid; Meteor; Planet; Star.

Comines (kō-mēn'), or **Comynes, Philippe de,** 1445–1509; French historian; b. Comines; councilor and chamberlain of Louis XI, and one of the wealthiest and most influential noblemen in France; in public service under Charles VII, but went into retirement after the advent of Louis XII. His "Mémoires" give a complete view of the political affairs of his time.

Comitia (kō-mĭsh'ĭ-ă), in ancient history, certain political assemblies of the Roman people; distinguished by the epithets *curiata*, *centuriata*, and *tributa*. The comitia curiata were the assemblies of the patrician houses or *populus*, and in these, before the plebeians attained political importance, was vested the supreme power of the state. The comitia centuriata were the assemblies of the whole Roman people, including patricians, clients, and plebeians, in which they voted by centuries. The comitia tributa were the assemblies of the plebeian tribes. According to tradition they were first instituted after the expulsion of the kings, and in them were transacted matters pertaining to the plebeians alone, as the election of their tribunes, etc.

Command'er Is'lands, two Russian islands in the line of prolongation of the Aleutian group; near the Kamtchatkan coast; name given in honor of Bering (known in those regions as the commander), whose death occurred on the extreme W. one, is also called by his name. Bering Island is 50 m. long, with a greatest breadth of 17 m. Medny or Copper Island is about 30 m. long, but not more than 5 broad. The islands are mountainous and without trees. The climate is mild for the latitude. Earthquakes are frequent.

Command'ments. See Decalogue.

Com'merce, exchange of goods in considerable quantities between producers remote from one another. In the Middle Ages commerce was carried on by markets. Down to about the twelfth century each village, as a rule, formed an independent community, having its own blacksmith, miller, and craftsman, as far as handicraft was developed, while spinning and weaving were carried on by each household. But as towns grew up they acquired market privileges from the king. Certain days were set on which the country people would carry their goods to town and make their purchases. These market towns became more and more the residence of craftsmen, and the place in which manufacture first developed. Survivals of this system of markets are to be seen in almost every town of Europe. The substitution of stores for markets, of regular channels of trade for irregular ones, forms the basis of the modern commercial system. The first race to carry on commerce on a large scale was the Phœnician, which furnished the most dar-

ing mariners of the ancient world; first in Sidon and Tyre, and later on an even larger scale in the Phœnician colony of Carthage. Much of the commerce of the later Roman republic and the early empire partook of the nature of tribute rather than of trade. Not until the rise of free or half-free cities on the Mediterranean was there a renewal of commercial activity. With the substitution of the modern system for feudalism, beginning abt. 1300, national commerce began to take the place of municipal. The mariner's compass, introduced into Europe, 1302; rendered possible the substitution of open-sea voyages for the coasting trade. The Portuguese were the first to take advantage of this invention, discovering in rapid succession Porto Santo, Madeira, the Azores, and the various coast localities of Africa as far as the Cape of Good Hope. In 1497 Vasco da Gama made the sea passage to the E. Indies. For the time being Lisbon seemed destined to become the commercial center of the world; and the Catholic Church supported the claims of Portugal to the E. discoveries. Meantime the Spaniards were not idle, and sought to discover a westward passage to the Indies, in the hope of counterbalancing the claims of Portugal. It was in connection with this attempt that Columbus discovered America (1492), and paved the way for the Spanish conquest of Mexico by Cortez (1520), Peru by Pizarro (1529), and Chile by Almagro (1535). Meantime, in 1514, Magellan had actually made the westward passage to the E. Indies, sailing through the strait which bears his name; and there ensued a period of active rivalry between Spain and Portugal in the establishment of stations for Indian and American commerce; but the power of Spain and Portgual as leading commercial nations was short lived. Less than one hundred years after the period named it gave place to that of Holland and England. The century following was signalized by the rise of France as a great commercial power, while the nineteenth century witnessed a similar development first of the U. S. and then of Germany. The development of inland or internal commerce came later, but has been of even more importance in modern times. The development of the foreign commerce of the U. S., Great Britain, and Germany in the last few years has been marvelous. In the U. S. during the fiscal year, 1907–8, the imports of both free and dutiable merchandise had a value of $1,194,341,792; the exports of domestic merchandise were valued at $1,834,786,357. During the same period the imports of gold and silver, in ore, bullion, and coin, aggregated $192,995,418; exports, $130,354,126. The total foreign commerce of the U. S., 1905–6, in all commodities reached the great aggregate of $3,105,223,664, and the duties on imports amounted to $300,657,413. In Great Britain, during the same period, the imports had a value of $2,884,477,822; exports, $1,727,172,026; and in the German Empire, during the calendar year 1905, the imports amounted to $1,649,510,000, and exports, $1,368,980,000. The accompanying table shows the shipping of the most important commercial nations. For political and economic consideration of commerce, see FREE TRADE; INTERSTATE COMMERCE; PROTECTION; TARIFF.

Commer'cial A'gency. See MERCANTILE AGENCY.

Commercial Law. See MERCANTILE LAW.

Commerce and La'bor, Depart'ment of, executive department of the U. S. Govt., created by Act of Congress, 1903, and comprising the Bureaus of Corporations, Manufactures, Labor, Census, Statistics, Fisheries, Navigation, Immigration, and Standards, the Lighthouse Board, Coast and Geodetic Survey, and Steamboat Inspection Service. Each bureau is under a chief, and the department under a secretary, who is a member of the President's Cabinet.

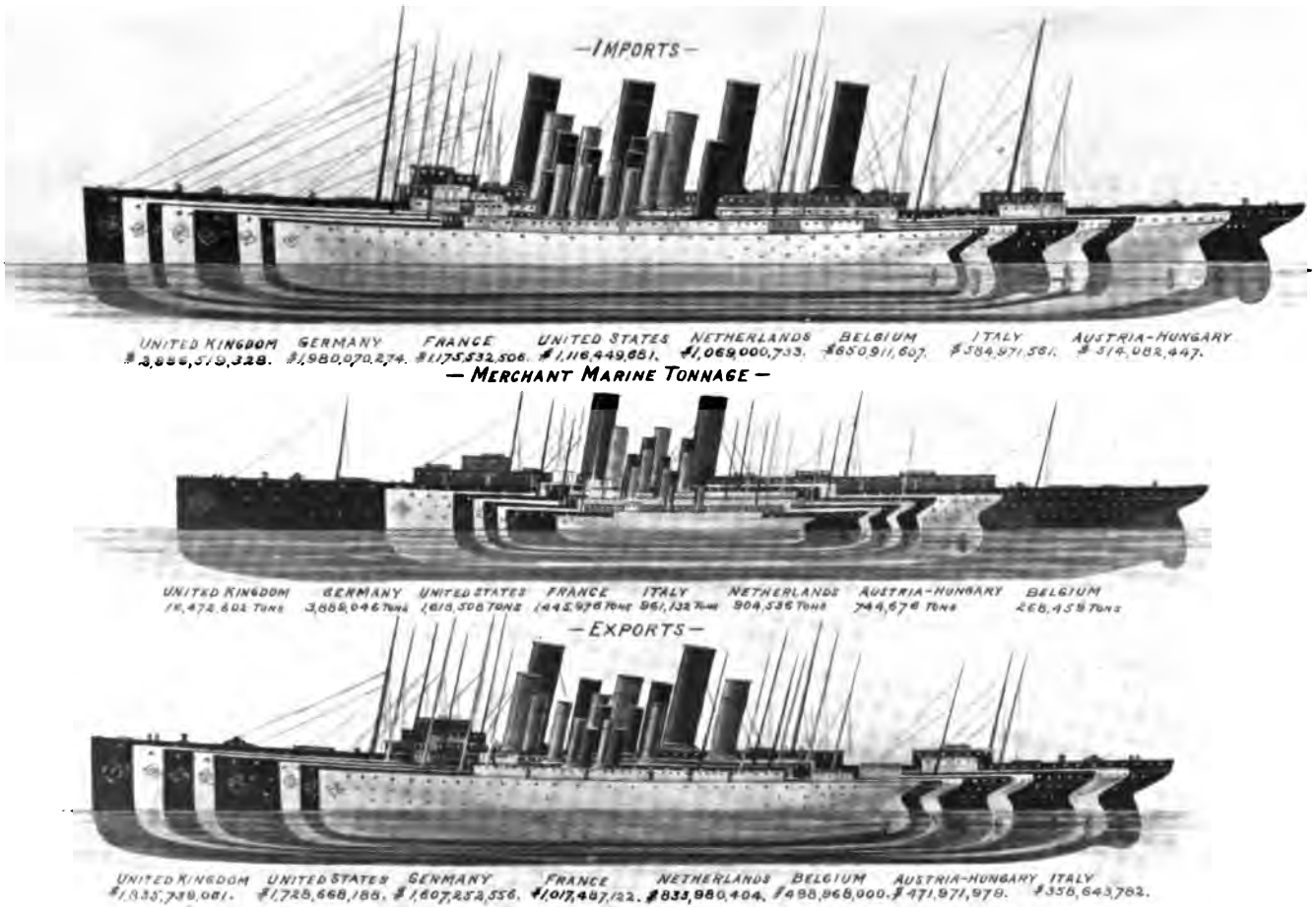
Commissa'riat, department of military administration in charge of the furnishing of food, forage, clothing, camp equipage, quarters, etc. In the U. S. these functions are divided between the subsistence department, which furnishes the food supplies, and the quartermaster's department, which furnishes camp equipage, quarters, etc.

Com'modore, formerly a courtesy title given in the U. S. navy to the senior officer of a squadron; in 1857 the title flag officer was substituted. In 1862 commodore was made the grade next above that of captain, and made to rank with brigadier general in the army, and in 1899 it was abolished. In the English navy the title is one of courtesy only given to the senior captain of a squadron when no admiral is present, or to the captain commanding a naval station abroad, as at Hongkong. A commodore when in command afloat flies a broad pennant. The title is one much affected by yacht clubs.

Com'modus, Lucius Ælius Aurelius, 161–192 A.D.; Roman Emperor; son of Marcus Aurelius; succeeded his father, 180, and soon manifested excessive cruelty and sensuality. His mistress Marcia, who had found her name marked down in his tablets for death, conspired with two of his officers, Eclectus and Lætus, and caused him to be strangled.

Com'mon Law, that body of English law which does not rest for its authority upon any express and positive declaration of the will of the legislature. It is distinguished from statute law. In the U. S. common law means both the common law of England, as exemplified in the reports of decided cases, etc., and the statutes passed by the English Parliament before the emigration of the first settlers to America. The common law is the basis of the jurisprudence of all the states with the exception of Louisiana, in so far as it conforms to the circumstances and institutions of the country, and has not been otherwise modified by statute. It is presumed to exist in the original colonial states and in states the population of which has been formed by emigration from the original states. It is sometimes called loosely the "unwritten law."

Common Pray'er, Book of, a collection of all the forms of worship used in the Church of



COMMERCE OF THE LEADING NATIONS.

COMPARISON OF THEIR ANNUAL IMPORTS AND EXPORTS AND THEIR SHARES IN THE CARRYING TRADE.

SHIPPING OWNED IN EACH COUNTRY OF THE WORLD OF 100 TONS AND UPWARDS.

(From "Lloyd's Register Book," 1907-1908.)

Flag.	Steamers.								Sailing Vessels.								Steamers and Sailing Vessels.	
	Wood and Comp.		Iron.		Steel.		Total.		Wood and Comp.		Iron.		Steel.		Total.		Grand Totals.	
	No.	Gross Tons.	No.	Gross Tons.	No.	Gross Tons.	No.	Gross Tons.	No.	Net Tons.	No.	Net Tons.	No.	Net Tons.	No.	Net Tons.	No.	Tons.
United States — Sea	400	202,802	188	314,027	441	986,230	1,029	1,503,059	1,809	1,083,638	38	45,356	58	96,658	1,905	1,225,652	2,934	2,728,711
United States — *Great Lakes	9	17,464	26	30,994	430	1,570,260	465	1,618,718	....	.....	....	.....	47	119,045	47	119,045	512	1,737,763
United States — Philippine Islands	29	5,719	33	21,044	21	12,355	83	39,118	29	6,336	....	.....	....	.....	29	6,336	112	45,454
United States — Total	438	225,985	247	366,065	892	2,568,845	1,577	3,160,895	1,838	1,089,974	38	45,356	105	215,703	1,981	1,351,033	3,558	4,511,928
British — United Kingdom	99	18,038	1,845	1,255,279	6,348	14,657,051	8,292	15,930,368	489	79,315	311	372,139	425	617,846	1,225	1,069,300	9,517	16,999,668
British — *Colonies	350	96,420	287	206,021	582	768,330	1,219	1,070,771	694	195,041	52	30,481	35	24,707	781	250,229	2,000	1,321,000
British — Total	449	114,458	2,132	1,461,300	6,930	15,425,381	9,511	17,001,139	1,183	274,356	363	402,620	460	642,553	2,006	1,319,529	11,517	18,320,668
Argentine	3	604	37	16,954	129	88,358	169	105,916	43	11,515	14	8,649	17	6,991	74	27,155	243	133,071
Austro-Hungarian	2	241	67	80,912	243	596,068	312	677,221	6	1,923	7	9,217	1	258	14	11,398	326	688,619
Belgian	....	.....	31	22,713	100	168,884	131	191,597	1	244	1	874	....	.....	2	1,118	133	192,715
Brazilian	5	1,429	62	52,940	216	136,719	283	191,088	72	16,012	3	2,373	3	1,212	78	19,597	361	210,685
Chilian	1	114	31	30,217	55	77,396	87	107,727	42	24,324	20	22,965	1	1,300	63	48,589	150	156,316
Chinese	7	4,060	16	21,316	27	42,258	50	67,634	....	.....	....	.....	....	.....	....	.....	50	67,634
Cuban	8	5,063	17	11,522	26	44,060	51	60,645	9	1,625	....	.....	....	.....	9	1,625	60	62,270
Danish	9	2,573	115	85,636	377	562,746	501	650,955	308	52,601	10	7,073	40	17,961	358	77,635	859	728,590
†Dutch	8	1,222	65	42,638	382	732,995	455	776,855	17	5,204	10	5,912	65	25,656	92	36,772	547	813,627
French	14	2,134	275	324,064	520	958,170	809	1,284,368	464	87,438	25	23,018	185	366,959	674	477,415	1,483	1,761,783
German	2	313	255	190,513	1,456	3,514,874	1,713	3,705,700	40	18,155	61	71,121	280	315,586	381	404,862	2,094	4,110,562
†Greek	8	1,028	102	93,475	145	327,240	255	421,743	155	44,362	1	427	....	.....	156	44,789	411	466,532
Italian	6	1,025	210	298,320	181	523,980	397	823,325	508	175,804	147	157,659	55	62,621	710	396,084	1,107	1,219,409
‡Japanese	332	89,690	159	259,536	338	719,521	829	1,068,747	6	3,129	....	.....	....	.....	6	3,129	835	1,071,876
Mexican	4	845	7	3,212	33	22,968	44	27,025	16	3,548	....	.....	2	473	18	4,021	62	31,046
Norwegian	100	37,854	332	242,214	749	983,934	1,181	1,264,002	664	313,414	261	280,110	55	61,005	980	654,529	2,161	1,918,531
Portuguese	4	877	20	12,009	41	49,789	65	62,675	119	28,229	9	9,391	5	743	133	38,363	198	101,038
Roumanian	1	169	5	638	17	28,142	23	28,949	2	419	....	.....	....	.....	2	419	25	29,368
†Russian	22	4,134	245	148,180	420	567,884	687	720,198	633	170,259	26	34,157	13	13,297	672	217,713	1,359	937,911
Spanish	5	1,357	204	177,214	259	494,730	468	673,301	105	31,084	3	3,107	2	1,257	110	35,448	578	708,749
Swedish	132	25,919	377	275,301	380	385,297	889	686,517	602	161,556	23	19,458	24	10,017	649	191,031	1,538	877,548
†Turkish	15	1,979	75	84,437	42	20,513	132	106,929	170	58,092	....	.....	....	.....	170	58,092	302	165,021
Uruguayan	1	374	5	3,066	27	34,706	33	38,146	16	8,951	8	7,491	4	2,859	28	19,301	61	57,447
Venezuelan	1	152	7	3,494	2	445	10	4,091	9	1,282	....	.....	....	.....	9	1,282	19	5,373
Other Countries	4	959	22	15,757	58	45,707	84	62,423	77	23,015	4	3,963	1	1,199	82	28,177	166	90,600
Total	1,581	524,558	5,120	4,323,643	14,045	29,121,610	20,746	33,969,811	7,105	2,606,515	1,034	1,114,941	1,318	1,747,650	9,457	5,469,106	30,203	39,438,917

*Wooden vessels trading on the Great Lakes are not included in the Register Book.
†The records of numerous small sailing vessels (belonging chiefly to Greece, Turkey, S. Russia, and the Dutch E. Indies) have been omitted from the Register Book.
‡Japanese sailing vessels of under 300 tons net are not recorded.

COMMERCE

England. The King's Primer, published by Henry VIII in 1546, was the first form of this book, but it contained only the Creed, Lord's Prayer, Commandments, and Litany. Edward VI had this primer twice revised and republished (in 1549 and 1552), and his second Liturgy is very similar to that which now exists. In the reign of Elizabeth the Liturgy was again revised (1559), but with few alterations. After the conference with the Presbyterians at Hampton Court, James I instituted another revision, and added the explanation of the sacraments in the Catechism (1604). It was again revised under Charles I (1633). After the restoration of Charles II, the Common Prayer Book was further revised, in 1662; very few changes have been made since that time. In the American Episcopal Church a revision of the English Prayer Book was rendered necessary by the necessity for the omission of the "State Prayers," and what is known as the "Proposed Book" was published in 1786. This compilation was chiefly the work of the Rev. Dr. William Smith, and failed of general acceptance. A return to the English book, with modifications, was set forth in 1789, which had been superseded by the present "Standard," issued in 1892.

Com'moner, one of the common people, applied in general to all persons except the hereditary nobility; also a student of the second rank in the Univ. of Oxford (England), who pays for his board or "commons" and other charges. The term "great commoner" has been applied to the English patriot Hampden, to the elder Pitt before he entered the House of Peers, to Gladstone, and to Thaddeus Stevens in the U. S.

Com'mons, House of. See PARLIAMENT.

Com'monwealth, a state, a body politic; properly a free state, a republic. The official title of Commonwealth is used by the states of Massachusetts, Kentucky, Pennsylvania, and Virginia.

Commonwealth of Eng'land, the form of government established in England on the death of Charles I, 1649, and which existed during the protectorate of Oliver Cromwell and his son Richard, until the restoration of Charles II, 1660. The substitution of a democratic for a monarchical form of government was provided for and enjoined by two successive charters. The first, drawn up in 1653, styled the "Instrument of Government." The second, called the "Petition and Advice," framed, 1657. Under the first charter the English Govt. may be classed among republics, with a chief magistrate at its head; under the second it became substantially a monarchy, and Oliver Cromwell, from 1657 to the period of his death, was virtually monarch of England.

Com'mune, name of two revolutionary bodies in Paris that played a most important part in French history. The first was a committee appointed by Parisian electors, June 25, 1789, which, on the eve of the taking of the Bastile, established the National Guard, and which was reorganized by the Constituent Assembly as the Municipal Government of Paris, May 21, 1791. On the night of August 10, 1792, acting in concert with the Jacobins, they established themselves as the insurrectionary commune, and spread terror among the Royalists by the slaughters of September. Next they joined the Montagnards, and organized the insurrectionary movements which resulted in the fall of the Girondists, May 31 and June 2, 1793. During the Reign of Terror they remained faithful adherents of Robespierre.

The second body, known as the Central Committee of the National Guard, headed an insurrection to establish absolute municipal self-government in Paris, 1871. It began by hostile demonstrations by the National Guard, which, after the entry of the German army into Paris, had been permitted to remain under arms "for the preservation of order." These demonstrations were in violation of the agreement of the government. The insurgents soon armed themselves and took up their principal position in an entrenched camp on Montmartre.

The prominent leaders of the Commune were Flourens, Félix Pyat, Assi, Delescluze, Paschal, Grousset, Gen. Cluseret, Dombrowski, Arnould, Jules Vallès, Blanqui, and Rochefort. Their principles and aims are thus defined: "Their philosophy is atheism, materialism, the negation of all religion; their political programme is absolute individual liberty by means of the suppression of government, and the division of nationalities into communes more or less federated; their political economy consists essentially in the dispossession, with compensation, of the present holders of capital, and in assignment of the coin, land, etc., to associations of workmen." The Communists quickly became absolute masters of Paris. Their ranks were reënforced by convicts and refugees. The new national government, organized at Versailles under M. Thiers, sent an army to suppress the insurrection. On April 2d the insurgents marched against Versailles. The army of the republic began to besiege Paris under the command of Marshal MacMahon. The chief command of the besieged forces was held successively by Dombrowski, Cluseret, Rossel, and Delescluze. The besieging army, about 90,000 strong, entered Paris on May 22d, inclosing the insurgents in a great semicircle. The latter for five days fought behind barricades in the streets, and revenged their defeat by atrocious acts of cruelty and vandalism. They set fire to the public buildings. During the last days of the Commune they shot Archbishop Darboy, Bonjean, and others held as hostages. The civil war ended on the 27th, when M. Thiers issued a bulletin saying that 25,000 Communists had been taken prisoners. Large numbers were put to death, and many deported.

Com'munism, theory that property should be held in common, which Plato advocates in his "Republic," and which was probably practiced by the followers of Pythoragas. In later times the Neo-Platonist Plotinus attempted to establish community of goods upon the plan proposed by Plato. Among the Jews the Essenes and Therapeutæ practiced a sort of

communism. The so-called communism of the Apostolic Church in Jerusalem lacked the essential features of communism. It was only partial and voluntary, was not copied by other Christians, and was a failure. Buddhism and other Oriental religious systems have for ages had followers who have practiced a rude communism. In Europe there were numerous mediæval sects (Catharists, Brethren of the Free Spirit, etc.) who advocated some practice of the kind. Later came the Anabaptists of Münster, the Libertines of Switzerland, the Familists of England. Still later we find the Herrnhuters, the Shakers, the Harmonists, the Buchanites, and numerous other religious communists. Bacon, More, and other English theorists wrote treatises which looked toward the ultimate establishment of communism, but Robert Owen was the first great advocate of the doctrine in the United Kingdom. The first French revolution brought forward a number of communistic theories, but none survived long; the best-known writer of that time was Babœuf. Subsequently these ideas were taken up by Saint-Simon, Fourier, Proudhon, and others. A large number of socialists, including the whole Russian wing of the party, believed that property should be held and industry controlled, as far as possible, by communities, or "communes," modeled more or less on the village communities of Russia. In thus laying stress on the commune they wished to weaken the powers of the central government, and adopted the doctrines of anarchism as distinct from socialism. See ANARCHIST; ONEIDA COMMUNITY; SOCIALISM.

Commu'nity Prop'erty, property acquired by husband and wife or either of them during marriage, when not acquired as the separate property of either. It includes the product of their industry and all property vesting in them by purchase, donation, bequest, or descent. The institution of community property is borrowed from the civil law, and has many of the incidents of partnership, but is not identical with it. It is recognized by statute in Louisiana and California, and in a number of other states created out of what were once French or Spanish dominions, and whose laws have been influenced by the civil law. In these states all property held by either husband or wife during coverture is *prima facie* presumed to be community property. During coverture the wife's rights are passive, and the husband has full power to dispose of it absolutely and without her consent, but he cannot dispose of any interest in it by an instrument to take effect after his death. The survivor has, in general, one half of the community property and the other half goes to the heirs.

Com'mutator, in electricity, a device for converting the alternating currents, generated in the armatures of dynamo machines, into continuous currents. In its usual form it consists of a series of copper blocks arranged symmetrically around the armature shaft, and insulated from the latter and from each other. To these are attached the terminals of the various coils, the current from which is to be commuted. Brushes of copper or of carbon are brought to bear at proper points on the commutator, making connection with each coil or set of coils in turn, and conveying the currents induced in them to the outside line. The essential point of the device is so to arrange the contacts that while the currents within the armature are reversed, at least twice in every revolution of the machine, the current in the outer circuits shall always have the same direction.

Co'mo, city and lake of Italy, in Lombardy. The city is the capital of province of same name; at the SW. extremity of the lake; 24 m. N. of Milan. It is beautifully situated in a valley inclosed by hills, covered with orange and olive trees. On a hill overlooking the town are the ruins of the Castle Baradello, destroyed by Frederick Barbarossa. Pop. (1901) 38,395.

Lake Como is an expansion of the Adda River, which enters it at the foot of the Lepontine and Rhetian Alps, and issues from the SE. extremity of the lake. It is divided into two branches, one of which, extending SW., is called the Lake of Lecco. It is 698 ft. above the sea, and about 35 m. from Como to the N. end; is nearly 3 m. wide; greatest depth, 1,925 ft., superficial extent, 62 sq. m. It is celebrated for the beautiful scenery of its shores.

Co'monfort, Ignacio, 1812–63; Mexican general; b. Puebla; served in the army in the war with the U. S.; started a revolt against Santa Anna at Acapulco, 1854; withstood a siege by 7,000 men; Secretary of War under Alvarez after Santa Anna's flight, 1855; and acting President; President under Constitution of 1857; crushed a series of revolts led by Church and Conservative parties; tacitly encouraged a movement to establish a dictatorship; Congress voted his deposition; garrison of Mexico declared against him; street fights occurred in capital; deserted by his friends, fled first to U. S., then to France, 1858; returned, 1862; became general of division; commanded Army of the Center during resistance to French invasion; defeated at San Lorenzo, May 8, 1863; Minister of War in the Juarez Cabinet; killed by irregular troops between Guanajuato and San Luis Potosi.

Co'morn, or **Ko'morn,** fortified town of Hungary; capital of county of same name; on the Danube; at the mouth of the Waag; 46 m. WNW. of Pesth; on the Great Schütt Island at its E. extremity. The Danube is here crossed by a bridge of boats. The fortress of Comorn, originally built by Matthew Corvinus, is considered one of the strongest in Europe, and requires for its defense 15,000 men. It was besieged and bombarded by the Austrians, 1848 and 1849, without success, but finally capitulated of its own choice, September 27, 1849. Pop. (1900) 20,264.

Com'oro Isles, group of four large islands and several small ones in Mozambique Channel, about halfway between Africa and Madagascar; volcanic in origin and mountainous, the highest peaks rise about 8,500 ft. The people are partially Arab and partially Malagasy in blood, mostly Mohammedans, support

themselves chiefly by tillage. Mayotte, one of these islands, has long been a French colony. The island of Johanna is celebrated for its beauty. The entire group was ceded to France, 1886. The islands once had considerable trade, which extended to India. Pop. estimated 80,000.

Com'pany, in military language, a body of troops commanded by a captain, assisted by his lieutenants, sergeants, and corporals. The Greek tetrarchia of sixty-four men corresponded to the company of infantry, which until quite recently varied in strength from about sixty to 100 men, the size being regulated so that the captain could personally watch and by his voice and example control the action of every man, making the company the strict "unit of combat." The strength of the company of cavalry (troop) and of artillery (battery) is determined by the same considerations. In the European armies of to-day the companies are much larger, giving fewer officers, and consequently reducing the pay rolls. The war strength of the German company is 250 men. The captain is mounted.

Company. See CORPORATION.

Compar'ative Anat'omy. See ANATOMY.

Com'pass, instrument used to show the magnetic meridian or the position of objects with reference to it. Among its various forms are the mariner's compass, the surveyor's compass, and the variation compass. These several applications each demand a special construction, but the essential parts are invariably the same. These parts are the needle, which consists of a magnetized bar of steel, and, fitted to its center, a cap which is supported on a pivot



MARINER'S COMPASS.

upright and sharp at the point to lessen the friction, and on which the needle may move with the slightest attraction. A circular card is attached to the needle of the mariner's compass, which turns with it, and indicates the degrees, which with the thirty-two points, divided into half and quarter points, are all marked on its circumference. The surveyor's compass has its circle divided into degrees or half degrees, and is furnished with vertical sights in order to secure accurate pointing. It is graduated from 0° to 90° from both N. and S. around to E. and W., so that the position of the N. end of the needle indicates the magnetic bearings of the line on which the sights are pointed. The variation compass shows such changes as occur daily in the deviation of the magnetic from the true meridian. The needle is much longer than in the mariner's compass, in order to make minute variations more apparent. Another form of variation compass is a surveyor's compass with a movable limb which can be set, with the help of a vernier, so that the readings are true bearings instead of magnetic ones.

"Boxing the compass" is the naming, in order, of the thirty-two points marked on the compass card. The Chinese used the loadstone as a guide over a thousand years B.C., and the earliest European compasses were made after the Chinese model. See MAGNETISM, TERRESTRIAL.

Com'passes. See DIVIDERS.

Compiègne (kôṅ-pē-āñ'), town of France; department of Oise; on the Oise; 44 m. NNE. of Paris. It was while heading a sortie from Compiègne (1430) that Joan of Arc was captured by the English. Pop. (1900) 16,503.

Complemen'tary Col'ors, any two colors which when mixed produce white. The mixture should be that of the light reflected from the surfaces to be compared, and not a mechanical mixture of the pigments themselves. The method which gives the best results is that of revolving disks painted in sectors with the colors to be compared. Owing to the persistence of vision, such a particolored disk when in rapid rotation presents a uniform surface to the eye. When the two colors with which it is painted are complementary, and are arranged so as to occupy proper relative areas on the disk, this surface will be white, or a neutral gray. There has been established the following set of complementary colors:

Carmine and blue green.	Greenish yellow and French blue.
Vermilion and green blue.	Green yellow and violet.
Orange and greenish blue.	Green and purple.
Yellow and blue.	

Com'pline, last of the canonical hours in the Roman Catholic Church, following vespers; consists of a general confession, four psalms, a hymn, the "Nunc Dimittis," prayers, and a commemoration of the Blessed Virgin. The corresponding office in the Greek Church is called *apodeipnon* (the after-supper service).

Compluten'sian Bi'ble, polyglot in six volumes, folio, so called from *Complutum,* the Latin name of Alcalá, Spain, where it was printed; contained the original texts, the Vulgate, the Septuagint, the Targum of Onkelos on the Pentateuch; was projected by Cardinal Ximenes, who spent about $150,000 on it; commenced, 1502, printed between 1514 and 1517, authorized by Pope Leo X, 1520, but apparently not circulated before 1522. Only 600 copies were printed. See BIBLE.

Compos'ite Or'der, in architecture, a form of column and entablature invented by the Romans, and characterized by a combination of Ionic and Corinthian elements in the capital. This was composed of an Ionic abacus and echinus with large corner volutes, and the

lower half of a Corinthian capital, with its two rows of acanthus leaves. The proportions of the column and the entablature were identical with the Corinthian, of which it was a mere variant (arch of Septimius Severus, baths



Composite Capital.

of Caracalla, etc.). The architects of the later Italian Renaissance invented various forms of entablature to accompany this capital. The composite order has never had any great vogue in modern times, being at best a patchwork of forms.

Compos'ites, an enormous family (*Compositæ*) of flowering plants (containing over 12,000 species) representing the highest development of the dicotyledonus structure. All parts of the plant body are well developed, and in the floral structure we find the widest departure from the primitive flower (presumedly somewhat like that of the buttercups). The compound pistil is compacted into a one-celled, one-seeded, inferior ovary, the stamens are united into a single anther ring, the petals are united into a narrow tube or a flat blade, and the calyx, when present, is usually modified for the dispersion of the seed. Moreover, the small flowers are massed into heads, which are often given prominence by the special modification of the marginal flowers. Common examples of the composites are afforded by the sunflowers, thistles, asters, and golden-rods, and the family is often called the sunflower family. They are widely distributed throughout the world, being especially abundant in America. In temperate and cold climates they are mostly herbaceous annuals or perennials, but in warmer regions many are shrubby or treelike. On the Great Plains of N. America and in the Rocky Mountain region species of *Artemisia,* known as "sage brush," are shrubs from 3 to 10 ft. in height. Some composites are of economic interest, yielding food or medicines, *e.g.,* lettuce, artichoke, Jerusalem artichoke, wormwood, arnica, etc.; many are important for ornamental purposes, *e.g.,* species of *Aster,* golden-rods, *Chrysanthemum, Dahlia,* etc. Some of the most troublesome weeds in the U. S. are members of this family, as the thistles, ragweeds, cockleburs, Spanish needles, oxeye daisy, etc.

Com'post, agricultural term used to designate any pile or mass of fermenting material which is to be used for the enrichment of the land. Formerly composts were very much used, but they have been largely superseded in recent years by the concentrated or chemical fertilizers, in which the fertilizing materials are present in known and definite amounts, and which are much lighter and cheaper to handle. Gardeners usually prefer compost at least a year old.

Compress'ed Air, as an agent for motive power, is used in tunneling, mining, quarrying, and the construction of steel framework and bridges, and where belts or shaftings cannot be employed on account of the great distance between the motive power and the point of application. The air is conveyed through strong pipes and tubes from the compressing plant to the drills or other machinery, and is utilized in a cylinder similar to that of the steam engine. An additional advantage in mines and tunnels is that the exhaust aids in ventilation and in keeping down the temperature; first used extensively in the construction of the Mont Cenis and Hoosac railway tunnels. In many cases it has been superseded by electricity, though new uses of compressed air, as for cleaning, are being developed. See Air; Pneumatics.

Com'promise of 1850, the series of measures which satisfied the conflicting demands arising from the proposed extension of slavery to the new territory acquired as a result of the war with Mexico. By provisions contained in these measures, California, which had formed (1849) a constitution prohibiting slavery, was admitted to the Union without slavery, and the slave trade was prohibited in the District of Columbia. But territory in New Mexico was conceded to Texas in response to its claims, and stringent provision was made for the return of fugitive slaves to their owners. By leaving Utah and New Mexico under territorial government, the question of slavery was remitted to the inhabitants, and the issue avoided. The measures passed Congress (1850) with Webster's support and Fillmore's approval, being proposed and carried by Clay in his usual character of pacificator.

Com'stock Lode, large and originally very rich gold- and silver-bearing vein in Storey Co., Nev.; about 12 m. NE. of Carson City; on the E. slope of the Virginia Mountains; produced, 1860–89, gold bullion valued at $340,000,000, and silver, $201,840,000; later production greatly reduced; highest gold record, 1877, $37,911,710; total gold and silver, 1905, $966,178.

Comte (kōnt), **Isidore Auguste Marie François Xavier,** 1798–1857; French philosopher and founder of the positive school of philosophy; b. Montpelier; became abt. 1820 a disciple of Saint-Simon, and contributed articles to his journal *L'Organisateur,* in which the germ of his ideas already appeared; was Tutor of Mathematics and Examiner at the Polytechnic School, 1832–52. His earlier work was entirely intellectual, but as the result of an ideal attachment to a Madame Clotilde de Vaux, he reshaped his philosophy, giving a high place to women and emotions, and elaborating a complete scheme of society and religion, which followed in many matters the

forms of the Roman Catholic Church, but was based entirely on the worship of humanity. Comte was the first systematic writer on the science of sociology. His most noted works are "Positive Philosophy," "Positivist Catechism," and "Positive Polity"; all of them have been translated into the leading languages. See POSITIVISM.

Co'mus, originally, the Greek name of those songs of carousal which young people would sing when passing the houses of their friends or lovers. Thence it became the name of the god of such revel; and Philostratus gives a description of a picture in which Comus was represented as a youth, drunken, sleeping, leaning forward on a down-turned torch. Milton makes him a sorcerer, son of Bacchus and Circe.

Concepcion (kŏn-sĕp'shŭn), **city** of Chile; capital of province of same name; on the Bio-Bio River, 7 m. from its mouth. The port, Talcahuano, 8 m. distant, exports large quantities of hides and tallow. Concepcion was founded by Valdivia, 1550; destroyed by Araucanian Indians, 1555; refounded by Garcia Hurtado de Mendoza, 1557; ruined by earthquakes in 1730, 1752, and 1825. Pop. (1904) 49,800.

Con'cept, in metaphysics, a thing which may be conceived; a collection of attributes united by a sign, and representing an object of possible intuition. Kant and his followers use the word to indicate notions which are general without being absolute. They divide these into three different classes: "Pure concepts," which derive nothing from experience; "empirical concepts," wholly derived from experience; "mixed concepts," ascribable partly to experience and partly to the pure understanding. A concept is "clear" when its object can be distinguished from any other; "distinct," when its component parts can be defined. See NOTION.

Concep'tion, in psychology, the last, finishing process by which consciousness takes possession of an object. It is distinguishable from sensation as active from passive. As long as an object is allowed to impress the mind through the senses, immediately and directly, without any reaction or interference from the side of the mind, consciousness is in a merely passive state; and this passive state of consciousness is called sensation. In order to master an object, the mind cannot stop, however, at the mere sensation; it must make the sensation itself the subject of a scrutiny and discrimination; and this active part of the whole psychological process by which the mind takes possession of an object is called perception and conception; the former referring to the sensation as representing the details of the object, the latter as involving the whole of it.

Concep'tualism, doctrine of the schoolmen intermediate between realism and nominalism. The realist asserts that genera and species have an independent existence—that there exist certain "ideas," the pattern after which single objects are fashioned. The nominalist asserts that nothing exists but things and names of things—that universals are mere names. The conceptualists assign to universals an existence which may be called psychological—that is, independent of single objects, but dependent on the mind of the thinking subject in which they exist as conceptions.

Concertina (kŏn-sẽr-tẽ'nă), musical instrument invented by Sir Charles Wheatstone in 1829; hexagonal in shape; with a keyboard at each end and an expansible bellows between the two. The air from the bellows pressing on free metallic reeds produces the sound, and this is effected both by drawing out and by pressing the bellows, the same note resulting in each case. The compass of the treble concertina is four octaves, through which there is a chromatic scale.

Concer'to, in music, (1) a composition for two or more instruments of the same or of a different kind, or (2) for a single instrument accompanied by an orchestra, designed to show the skill of a performer. The modern concerto was invented by Giuseppe Torelli, 1686. Its form was finally settled by Mozart.

Conchoidal (kŏn-koid'ăl), shell-like; used in mineralogy to describe a variety of fracture. When the fractured surface of a mineral exhibits curved concavities similar to the valve of a bivalve mollusk, it is said to have a conchoidal fracture; *e.g.*, flint, anthracite coal, etc.

Concha'gua, Gulf of. See FONSECA, BAY OF.

Conciergerie (kōn-syărzh-rē'), **La,** a part of the Palais de Justice in Paris formerly the residence of the concierge or custodian of the palace, but famous historically as a prison during the French Revolution. Here Queen Marie Antoinette was imprisoned, as well as Robespierre, Madame Roland, Danton, and many others. Napoleon III also occupied it in 1840. It is still used, but only for prisoners awaiting transfer elsewhere.

Con'clave, apartment in which the cardinals of the Roman Catholic Church assemble to elect a pope, or the assembly itself. When a pope dies, nine days are allowed for the funeral solemnities. The cardinals assemble on the tenth day, and voting begins on the eleventh. The large halls of a papal palace in Rome or the city where the pope dies are so divided by wooden partitions as to furnish a number of sets of small apartments, all opening on a corridor. All the entrances to the building are closed but one, which is given in charge to officials. No intercourse with the public is held while the election is going on. From their separate cells, or, rather, wooden stalls, the cardinals come together twice a day till some one of their own number is made pope by a two-thirds majority. Each cardinal is attended by one or two waiters, called conclavists, sworn to secrecy like the cardinals. This method, in its main features, dates from 1273, a constitution, known as that of Gregory X, regulating the mode of electing the Pope, having been carried in the Ecumenical Council of Lyons, July, 1273.

Concom'itance, Sacramen'tal, doctrine of the Roman Catholic Church that the body and

blood of Christ sacramentally accompany each other, so that both are sacramentally received under either species, whether of bread or wine; hence that the communion in one kind imparts all that is received sacramentally in both kinds. The Lutheran Church maintains that from a natural concomitance we cannot argue to a sacramental one, which is wholly supernatural and dependent on the will of Christ; that this doctrine implies that the officiating priest receives both body and blood twice; and that it holds equally good for one kind in the sacrifice of the mass.

Con'cord, town of Middlesex Co., Mass.; on the Concord River; 20 m. NW. of Boston; was the first settlement in New England not on the coast; incorporated in 1635; the first provincial congress of Massachusetts assembled in its old church, 1774, and made the town the place of deposit for the military stores of the colony. On April 19, 1775, at the North Bridge, in an affair known as Concord Fight, or battle of Lexington, a body of American soldiers, organized under legal authority, advanced against British troops sent to seize those stores, received their fire, by command of their officers returned it, forced the enemy to retreat, and by this first attack under military orders on the soldiers of the king began the war of the Revolution. Concord was the home of Alcott, Emerson, Hawthorne, Thoreau, and other literary celebrities. Pop. (1905) 5,421.

Concord, capital of New Hampshire and of Merrimac Co.; on the Merrimac, 75 m. NW. of Boston; one of the largest railroad centers in New England; has manufactures of carriages, electrical apparatus, machine-shop products, leather goods, pianos, and cotton and woolen goods, and large car building and repair shops. Concord was the headquarters of the Penacook tribe of Indians, under Passaconway, who were friendly to the English. It was granted by Massachusetts as Penacook, 1725; incorporated Rumford, 1730; came under jurisdiction of New Hampshire, and incorporated Concord, 1765; state capital, 1816; adopted city charter, 1853. Pop. (1906) 21,210.

Concord'ance, compilation containing all or the principal words in the Bible, or other set of books, arranged alphabetically, with reference to the books, chapters, and verse. There are concordances of the Hebrew and Greek biblical texts, and of the principal translations, that of the Vulgate (thirteenth century) being the earliest of all. Cruden's "Complete Concordance" (1737) is the basis of every English concordance since published. Similar concordances have been compiled of the works of Shakespeare, Homer, Dante, Plato, etc.

Concor'dat, treaty between the pope as head of the Roman Catholic Church and a civil government in relation to all or some of the ecclesiastical affairs of the Roman Catholic Church in the respective state. Usually the subjects treated of are those which have at once a civil and a religious aspect, hence called "mixed" matters, though purely temporal and purely spiritual matters are occasionally treated. The concordat is sometimes published by a papal bull, followed by the ratification of the respective state, sometimes by a formal treaty signed by the plenipotentiaries of the contracting parties. They are generally looked on as international contracts, or treaties, binding on either side, but revocable by either party when the express conventions are violated, when their fulfillment is physically or morally impossible, etc. The most famous modern concordat was that agreed to in 1801 between Pius VII and Napoleon I, in seventeen articles, which recognized the Roman Catholic religion as that of the majority of French citizens, provided for the free exercise of Catholic worship, the salary of its ministers, etc. The pope, on his side, recast the hierarchy in France, accorded to the First Consul the right of indicating candidates for the episcopal sees, reserving to himself the canonical institutions, and renounced the claims of the Church to the confiscated ecclesiastical goods. This concordat was not to hold good in case the head of the French Govt. should cease to be a Roman Catholic. The Holy See did not recognize the "organic articles" added in 1802 by Napoleon. This concordat was practically abrogated in 1905 by the enactment of a law in France providing for the separation of Church and State. The taking of inventories of Church property throughout the country, as provided by the law, led to serious disturbances in many quarters, and in Paris the police and national guard were called out to overcome resistance at some churches. The pope issued in 1906 an encyclical on the separation law, declaring that the religious associations provided by the law were inadmissible without violating the sacred rights pertaining to the life of the Church.

Con'cord, Book of, collection of the Confessions which are received either by the entire Lutheran Church or by the larger part of it; published 1580; contains (1) the three general creeds (the Apostles', Nicene, and Athanasian); (2) the Augsburg Confession; (3) the Apology of the Confession; (4) the Smalcald Articles; (5) the Smaller and the Larger Catechism of Luther; and (6) the Formula of Concord, to which the Book of Concord is related as the whole to a part, though the two are often confounded.

Concor'dia, goddess of Roman mythology; a personification of domestic concord and of harmony between several classes of the body politic. Several temples were erected to her in



ancient Rome. The sessions of the senate were sometimes held in the Temple of Concord (Ædes Concordiæ).

Con'crete, in philosophy, said of any quality which is considered in connection with the object to which it belongs; a quality not concrete is abstract. Thus "wisdom" is an abstract quality; but when we speak of a "wise man" the quality becomes concrete.

Concrete Construc'tion, construction by the use of concrete or "liquid stone," the basis of which is Portland cement, a material used principally for foundations and sidewalks up to 1890. Since that date reënforced concrete has come into extensive use for many purposes, especially the construction of lofty office buildings, grain elevators, residences, bridges, dams, telegraph poles, factory chimneys, piles, railway tiles, fence posts, and roofing tiles. Modern business buildings thus constructed consist of a steel frame with a concrete envelope, which protects the metal from oxidation by atmospheric influence and distortion by fire. Factory chimneys 350 ft. high, and at least one bridge span of 146 ft., have been made of reënforced concrete. In the case of lofty buildings, chimneys, etc., a wooden mold is built around the girders, or framework, into which the liquid concrete is forced. The material sets in a few hours, when the wooden shields are removed. In addition to the advantages concrete possesses over stone, brick, or terra cotta, in that it is made on the spot and not transported from a distance, are those of its withstanding a greater pressure than any other material, its imperviousness to dampness, and resistance to fire. Its lasting qualities are evidenced when the fact is stated that the dome of the Pantheon at Rome, erected 27 B.C., which is of concrete, is still standing.

In building the Mississippi jetties blocks of concrete were used which weighed from twenty-five to seventy-two tons each. The lower part of the pedestal of the Statue of Liberty in New York harbor is solid concrete, 91 ft. sq. at the base, 65 ft. sq. at the top, and 52 ft. in vertical height. Concrete can be deposited under water by inclosing it in paper bags which burst when thoroughly wet, and sometimes it is allowed to slide down through the water in a long box or tube, called a *trémie.*

A standard formula for concrete is: one barrel of cement, three barrels of sand, and five barrels of broken stone or gravel. For unimportant work the proportion of stone may be increased, and part of the cement replaced by lime. Beton is sometimes called concrete, but beton is strictly hydraulic mortar in which cement and sand have been thoroughly mixed while wet. The compressive strength of concrete ranges from 700 to 3,000 lb. per sq. in. when two years old, and it strengthens with age. Concrete costs from $2 to $10 per cu. yd., according to the quality of its ingredients. See BUILDING STONE.

Condamine (kôṅ-dä-mēn'), **Charles Marie de la,** 1701–74; French geographer; b. Paris; distinguished at the siege of Rosas, 1719; visited the East, Africa, and Peru, measuring an arc of the meridian in the latter, 1735; discovered that the deflection of a plumb line by a mountain is large enough for measurement; said to have introduced caoutchouc into Europe; wrote largely on geography and other sciences.

Condé (kōn-dā'), name of a younger branch of the Bourbon family, of whom the most important members follow: CONDÉ, LOUIS I DE BOURBON (Prince de), 1530–69; French general; founder of the house of Condé; b. Vendôme; son of Charles de Bourbon, Duc de Vendôme; brother of Antony of Bourbon, and uncle of Henry IV; as an adversary of the family of Guise, took a prominent part in the conspiracy of Amboise, 1559; general in chief of the Huguenots in the civil war which began 1562; defeated and taken prisoner at Dreux, 1562; commanded at the battle of St. Denis, 1567; defeated and wounded at the battle of Jarnac, March 15, 1569, he was shot after he had surrendered. CONDÉ, HENRI I DE BOURBON (Prince de), 1552–88; son of Louis I and cousin of Henry of Navarre; joined the Protestant army abt. 1584; left a son, Henry II, Prince de Condé (d. 1646), who was educated a Roman Catholic, and was the father of "the Great Condé. CONDÉ, LOUIS II DE BOURBON (Prince de), styled THE GREAT CONDÉ, 1621–86; French general; b. Paris; son of Henri II, Prince of Condé; in youth was called the Duc d'Enghien; married, 1641, Claire Clémence de Maillé-Brézé, niece of Cardinal Richelieu; May, 1643, gained a signal victory over the Spaniards at Rocroi; defeated the Bavarian general, Mercy, at Nordlingen, 1645, and inherited his father's title, 1646; gained a decisive victory over the Spaniards at Lens, 1648. In the civil war of the Fronde, which began 1649, he at first supported Mazarin and the royalist party. Early in 1650 he was arrested by Mazarin, whom he offended by his haughty conduct. After he had been imprisoned nearly a year he was released, and raised an army to fight the court. He marched in 1652 against Paris, which was defended with success by Turenne. In 1653 he was condemned to death, and entered the service of the King of Spain, who gave him command of an army in Flanders. He was there opposed to Turenne, over whom he could not gain much advantage. The war was ended by a treaty between France and Spain, 1659. The Prince of Condé was then pardoned and returned to the service of the French king. Having obtained command of an army in Flanders, he fought an indecisive battle at Seneffe against William, Prince of Orange, 1674. CONDÉ, LOUIS JOSEPH DE BOURBON (Prince de) 1736–1818; only son of the Duc de Bourbon; served with distinction in the Seven Years' War (1755–62), and emigrated as a royalist, 1789; led the French emigrants who, 1792, fought against the republic in coöperation with the Austrian army; disbanded his corps of emigrants, 1801, and returned to France, 1814. CONDÉ, LOUIS HENRI JOSEPH (Prince de), styled also DUC DE BOURBON, 1756–1830, the last of the line of Condé; father of the Duc d'Enghien, who was murdered, 1804; Condé fought against the French Republic, 1792–

1800; died by violence, perhaps by his own hand.

Condens'er, in electricity, device in which the electrostatic induction between charged bodies is made use of for the accumulation and storage of considerable quantities of electricity. The simplest form of condenser consists of two parallel metallic disks separated by a layer of air. The best-known form is the Leyden jar. Condensers of large capacity are made by separating many sheets of tinfoil by mica or paraffined paper. Such condensers are usually constructed so that their capacity will be exactly a microfarad (see FARAD), or some simple multiple of that standard.

Condillac (kōṅ-dē-yăk'), **Étienne Bonnot de,** 1715–80; French philosopher; b. Grenoble; associated in youth with Rousseau and Diderot, but later ceased intimacy; preceptor of the Duke of Parma; admitted to French Academy, 1768; principal works, "Essay on the Origin of Human Knowledge," 1746; "Treatise on Sensations," 1754; and "Course of Study," comprising "The Art of Thinking," "The Art of Writing," and other works; taught that our knowledge and ideas are derived from the operations of the senses, that man owes the development of his faculties to the use of signs.

Con'dor, great vulture of the Andes, the *Sarcorhamphas gryphus* (family *Cathartidæ*). The adult male is glossy black, with a conspicuous ashy white mark upon the wing; a ruff of soft white down encircles the neck,



CONDOR.

which, as well as the head, is bare and wattled. It is somewhat under 4 ft. in length, and its spread of wing is 9 ft. The legs are powerful, but the feet are not fitted for seizing and tearing. The female is duller colored than the male, and lacks the wattles. The condor is a resident of the Andes from Ecuador to the Strait of Magellan, and breeds upon precipices, laying two dull-white eggs on the bare rock. Its favorite food is carrion, but it is said to attack and kill young or sickly animals. Its powers of flight are wonderful, and it has been seen soaring above the summits of the Andes 5 m. above the sea. The California vulture (*Pseudogryphus californianus*) is also sometimes called condor. It is more lightly built than its S. relative, but has a greater expanse of wing, sometimes measuring 10 ft. from tip to tip. In habits the two birds are similar. The N. bird is restricted in its range, which extends only from the Colorado to the Columbia River, and from the Sierra Nevada to the sea.

Condorcet (kōṅ-dōr-sā'), **Marie Jean Antoine Nicolas Caritat** (Marquis de), 1743–94; French philosopher and mathematician; b. Ribemont; settled in Paris, 1762; admitted to the Academy of Sciences, 1769, and to the French Academy, 1782; President Legislative Assembly, siding with the Girondists, 1792; after their fall he was concealed by friends to save his life; quitted his refuge for relaxation, was captured at Clamart, imprisoned, and died from self-administered poison. He had a large share in the "Encyclopédie," and among other works wrote "Historical Sketch of the Progress of the Human Mind." Lamartine called him the Seneca of the modern school. He believed in human perfectibility, and had high ideals of human destiny.

Condottieri (kŏn-dŏt-tyā'rē), Italian mercenaries who, during the Italian wars in the fourteenth and fifteenth centuries, took service under any prince or government that chose to engage them; consisted principally of heavy-armed cavalry, and the wars of Italy were long left entirely to them. There came to be an understanding between them to spare their troops as much as possible, until at length battles were fought with little more hazard than would be incurred in a tourney. Among the most celebrated were Lodrisio, abt. 1339; Fra Moreale, 1350; Guarmeri, Lando, and Francesco di Carmagnola, abt. 1412; Francesco Sforza, abt. 1450; and Sir John Hawkwood, abt. 1329–94.

Conduc'tion. See ELECTRICITY; HEAT.

Conduct'or, substance through which electricity can pass freely, or on which, if insulated, a charge of electricity can be maintained. Different substances conduct electricity with greater or less readiness. Conductivity varies also according to circumstances, and substances that are usually nonconductors sometimes transmit electricity.

Cone, in geometry, a solid figure described by a straight line moving in such a way that it always passes through a given curve inclosing a portion of a plane and through a fixed point not in that plane. The fixed point is called the vertex of the cone, and the portion of the plane inclosed by the given curve is the base of the cone. When the base is a circle, and the line drawn from the vertex to the center of the circle is perpendicular to the plane of the circle, the figure is a right cone. If this line is not perpendicular to the plane of the base, the figure is an oblique cone. In popular usage the cone is considered as lim-

ited to that portion of the figure between the vertex and the base; but in mathematics the line describing the cone is supposed to extend indefinitely beyond the base. Every straight line drawn from the vertex through the curve inclosing the base is called a side of the cone. The distance from the vertex to the base measured on any one of these lines is the slant height. The perpendicular distance from the vertex to the plane of the base is the altitude of the cone. The area of the surface of a right cone is equal to half the circumference of the base multiplied by the slant height. The volume or solidity of a right cone is equal to one third the area of the base multiplied by the altitude.

Conecte (kō-nĕkt'), **Thomas,** d. 1434; French martyr; b. Rennes, toward the close of the fourteenth century; Carmelite monk, who produced a deep impression by his preaching, denouncing the vices of society at large, and especially the corruption of the Church. From France he passed into Italy, where his success was still more pronounced; as he also preached against the secular power of the pope and the hierarchy, he was accused of heresy, seized, and burned at the stake in Rome.

Co'ney Is'land, island and pleasure resort, in Brooklyn Borough, New York City; at the W. end of Long Island; abt. 5 m. long from E. to W., and averaging less than 1 m. in width; separated from the mainland by a narrow creek. Until 1874 it was a neglected waste, only the W. end being used to any extent for bathing and recreation; in four years the few rude restaurants and bathing houses on a desolate beach were replaced by hotels, concert halls, improved bathing houses, and all the minor amusements suited to great and varied congregations of people. Its great attraction is its beach, 5 m. long, fronting the Atlantic. It is considered the safest beach, extensively used for bathing purposes, on the coast. Henry Hudson discovered this island, September 3 or 4, 1609. A crew from his ship landed on the shore and trafficked with the Canarsie Indians. Afterwards there was a quarrel, and John Coleman, a sailor, was killed by the savages. Coleman was buried at what was long known as Norton's Point, and now as Sea Gate. Coney Island, therefore, has an historical interest as the scene of the first landing of Europeans in the State of New York and as holding the grave of the first white man.

Confed'erate States, or **South'ern Confed'eracy,** federal compact formed at Montgomery, Ala., 1861, by the states of Georgia, Alabama, Florida, Texas, Louisiana, Mississippi, and S. Carolina, which had seceded. Virginia, Tennessee, N. Carolina, and Arkansas afterwards joined the Confederacy, and the states of Kentucky and Missouri, which had not seceded, were represented in the Confederate Congress as well as in that of the U. S. The congress of delegates met February 4th, adopted a provisional constitution February 8th, and a permanent constitution, by unanimous vote, March 11th. This instrument was modeled on that of the Federal Union, except that it expressly asserted the right to take slaves into any state or territory of said confederacy, and there hold them as property. The states forming the compact had an aggregate population of 2,656,948 free persons and 2,312,046 slaves. Jefferson Davis, of Mississippi, was made President, and selected as his cabinet: Robert Toombs, of Georgia, as Secretary of State; Leroy P. Walker, of Alabama, Secretary of War; Charles G. Memminger, of S. Carolina, Secretary of the Treasury; Stephen R. Mallory, of Florida, Secretary of the Navy; Judah P. Benjamin, of Louisiana, Attorney-General; John H. Reagan, of Texas, Postmaster-General. The three last mentioned continued in office to the end. Toombs, Walker, and Memminger were succeeded by others. Alexander H. Stephens, of Georgia, was made Vice President. Montgomery was continued as the capital, and the first Congress there organized, April 20th. On July 20th Richmond, Va., became the capital. On November 6th Davis and Stephens were elected for a term of six years. The final adjournment of the Congress occurred March 18, 1865, at which time the Federal forces were investing Richmond. See CIVIL WAR.

Confederate Vet'erans, Unit'ed, patriotic society organized at New Orleans, June 10, 1889. Its purpose is strictly social, literary, historical, and benevolent. Its constitution says that it "will endeavor to unite in a general federation all associations of confederate veterans, to gather authentic data for an impartial history of the war between the states; to preserve relics or mementoes of the same; to care for the disabled and extend a helping hand to the needy; to protect the widows and the orphans, and to make and preserve a record of every member." State organizations are called divisions. The permanent headquarters of the association are at New Orleans, La. Number of camps, 1,660. Number of members abt. 75,000.

Confederation, league, federal compact, alliance of princes, states, or nations; nearly synonymous with confederacy. The Republic of Mexico is called the Mexican Confederation. The numerous states of Germany were united, 1815, by the Congress of Vienna, and formed the Germanic Confederation. Before the adoption of the Federal Constitution of the U. S., 1788, the government of the country was a weak confederation of thirteen independent states, with no superior or central authority.

Confederation, Ar'ticles of, document drawn up by the Congress of the U. S., November 15, 1777, and adopted finally, July 9, 1778, but not ratified by the states until March 1, 1781. By this compact the several states united in a league of perpetual friendship "for the common defense, the security of their liberties, and their mutual and general welfare." These articles, thirteen in number, proved inadequate to the situation, because Congress had very limited powers, and the executive had no means of enforcing its authority in opposition to the will of individual states. For these reasons a convention called by Congress met at Philadelphia, May 14, 1787, with Washington

as its president, and on September 14th of that year the convention closed its labors and reported the Constitution of the U. S.

Confederation of the Rhine, league formed, July, 1806, by sixteen German states under the protection of Napoleon. The princes of these states signed an act of confederation, dissolving their connection with the Germanic empire and forming an alliance with the French emperor. They were headed by the kings of Bavaria and Würtemberg. The confederation had an area of 126,075 sq. m., and a pop. of 14,608,877. In 1810 a part of the confederation was, incorporated with France, and its territory reduced to 114,467 sq. m., with 13,475,000 inhabitants. At the downfall of Napoleon the confederation was dissolved, 1813, and its members united with the other German states to form the Germanic Confederation.

Confes'sion, declaration of one's sins to a duly authorized priest with a view of obtaining absolution. The Greek Church regards this discipline as necessary for the reception of the Eucharist. The Lutheran professes that private confession may be retained in the Church, but that particular statement of sin is not necessary. The Church of England employs a general form of confession in its services, but has a form of private confession in connection with visitation of the sick. The Scottish and most of the other Protestant churches do not recognize it at all. See AURICULAR CONFESSION.

Confession of Faith. See CREED.

Confes'sional, in the Roman Catholic Church, a place reserved for the hearing of confession with a seat for the priest and a place for the penitent to kneel. This has been commonly since the Middle Ages an inclosed cabinet or closet of wood, sometimes ornamental, and forming part of the church furniture. The priest's compartment has a penitent's compartment on each side of it. See AURICULAR CONFESSION.

Confirma'tion, in some churches a sacrament, in others a rite, supplemental to baptism. Its history is traced to the apostles, who were wont to lay hands on new converts, and to pray that they might receive the Holy Ghost. In the Latin and Anglican churches only bishops administer the rite; in the Greek Church, both bishops and priests. The Lutheran and Reformed churches of Germany practice confirmation as a renewal of the baptismal covenant, or compact on the part of the new member.

Confisca'tion, the forfeiture of land or other property to the public treasury as part of the punishment of certain crimes. During the French Revolution a large quantity of land owned by the Church was confiscated—*i.e.*, was taken from the Church in order to convert it into a source of national revenue.

Confu'cius (Latinized form of Chinese K'UNG-FU-TSZE, "the Master K'ung"), 551–478 B.C.; Chinese philosopher; b. Lu, one of the feudal states into which China was then divided, now a part of the province of Shantung. Though he did not commit his teachings to writing, thanks to the care with which his disciples recorded not only his sayings but also his manner of life, hardly any character of antiquity is so well known to us. He became a teacher at twenty-two, and to propagate his doctrines visited neighboring countries, preaching and teaching; returned abt. 506. He left a grandson, Tse-tse, and, 1671 A.D., there were eleven thousand male descendants bearing the name of the philosopher, most of them of the seventh generation. These descendants constitute a distinct class in Chinese society. No founder of a religion has had more influence over an entire race than has Confucius; but he was not the originator of a religious creed. While striving to introduce a ritual more minute than that of Moses, he rejected divine revelation, and built a system of moral philosophy on the wants and tendencies of human nature. The books containing his doctrines bear about the same relation to the Chinese world as the Bible does to the Christian. The system of Confucius is shown by an extract from the "Ta Hioh," or "Great Lesson," a fragment of two hundred and seventy-five words attributed to him. It says:

"The ancients who desired to illustrate illustrious virtue throughout the empire first ordered well their own states. Wishing to order well their own states, they first regulated their families. Wishing to regulate their families, they first cultivated their own persons. Wishing to cultivate their persons they first rectified their hearts. Wishing to rectify their hearts, they first sought to be sincere in their thoughts. Wishing to be sincere in their thoughts, they extended their knowledge to the utmost; and this extension of knowledge lay in the investigation of things. Things being investigated, knowledge became complete. Their knowledge being complete, their thoughts were sincere. Their thoughts being sincere their hearts were then rectified. Their hearts being rectified, their persons were cultivated. Their persons being cultivated, their families were regulated. Their families being regulated, their states were rightly governed. Their states being rightly governed, the whole empire was made tranquil and happy. From the emperor down to the mass of the people, all must consider the cultivation of the person the root of everything besides." One of his disciples asked: "Is there one word which may serve as a rule of practice for all one's life?" The master said: "Is not *reciprocity* such a word? What you do not want done to yourself do not do to others."

Congaree', river of S. Carolina; formed by the Broad and Saluda rivers, which unite at Columbia; flows SE., and joins the Wateree to form the Santee River. Steamboats ascend the Santee and Congaree to Columbia.

Con'ger, a marine eel, having a more pointed tail than the common species. The skin is scaleless; head depressed and pointed; mouth deeply cleft; under jaw slightly projecting beyond the upper; outer series of teeth in either jaw forms a cutting edge. Color dark brown above, dirty white below; dorsal and anal fins

pale, edged with black, or entirely black. It is a widely distributed species, found on the coasts of Europe, Japan, Tasmania, and the E. U. S. It may be 8 ft. long, and weigh 100 lb.; is used for food in Great Britain; is voracious, active, powerful, and susceptible to cold. In California the name is applied to one of the Muræna, and in the E. U. S. to the eelpout.

Conges'tion, fullness of blood or repletion of the blood vessels. Congestion may be arterial or active, when the overfilling of the vessels is due to increased flow of blood to the part; or passive or venous, when it is due to obstruction to the outflow of blood. Active congestion results from excitement of the circulation by emotional disturbances, exercise, alcohol or other poisons, from exposure to cold, or direct irritation of the part; passive, from mechanical obstruction of the circulation; and localized passive, from pressure upon the venous trunks of different parts. When active the affected part is light red in color; when passive the color is dark red or bluish.

Conglom'erate. See SANDSTONE.

Con'go, FREE STATE and RIVER. See KONGO.

Congrega'tionalism, system of Church polity which embraces the principle of self-government in the local church, and the duty of churches to stand in fellowship or communion with one another. The principal instrument of Church communion is ecclesiastical councils, whose function is to give counsel and to express fellowship, but never to issue commands. Thus Congregationalism differs from independency in maintaining the fellowship of distinct churches, and from Presbyterianism in denying the right of a presbytery or synod to exercise authority over the churches. It is through this feature of the communion of churches by means of councils that Congregationalism in the U. S. differs from Congregationalism in Great Britain. See INDEPENDENTS. Congregational methods of administering church affairs may be adopted alike by Calvinists, Arminians, Socinians, and Arians. At the same time, the churches which are generally known as Congregational have held to positive and evangelical views of truth, being Calvinistic rather than Arminian, Trinitarian rather than Socinian or Arian.

The early home of American Congregationalism was New England. The Pilgrims who settled Plymouth and the Puritans who settled Massachusetts and Connecticut united in its adoption. As the population moved westward, this form of Church order spread extensively through the West and Northwest, while in the South and Southwest, until recently, it was but little known. Recognizing the importance of culture and an educated ministry, the Congregationalists have been distinguished as the founders and liberal supporters of schools, colleges, and theological seminaries. They have coöperated with other denominations in missionary and benevolent organizations which, like the American Bible Society, have invited to united effort in philanthropic work, and in efforts to promote Christian union. In 1907 they united with the United Brethren and Methodist Protestants in forming an organic body to be known as the United Churches. In 1908 the number of communicants in Congregational churches was 699,327.

Con'gress, in international politics, an assembly of the sovereigns or plenipotentiaries of several states to determine questions and concert measures of common interest. In recent years the word "conference" has been commonly applied to international meetings of statesmen for the settlement of international complications.

The first general European congress was after the conclusion of the Thirty Years' War in Germany, at Münster and Osnabrück, 1648. Remarkable general congresses have been: Of the Pyrenees (1659); at Aix-la-Chapelle (1668); Nimeguen (1676); Ryswick (1697); Utrecht (1713); Aix-la-Chapelle (1748); Teschen (1779); Paris (1782); Versailles (1785); The Hague (1790); Rastadt (1797); Erfurt (1808); Vienna (1814, concluded at Paris, 1815); Aix-la-Chapelle (1818); Troppau (1820); Laybach (1821); Verona (1822); Berlin (1878).

Congress, title of the national legislature of the U. S. of America. It consists of a House of Representatives and of a Senate. The former is composed of members chosen every second year. The qualification of electors is the same as that required in their respective states for electors to the lower house in the state legislature. The number of representatives from each state is apportioned according to population, and a new apportionment is made every ten years after the census is taken. The Senate is composed of two members from each state; chosen for six years by the legislature of the state. The House of Representatives chooses its own Speaker; the Vice President of the U. S. is *ex-officio* president of the Senate. Bills for revenue purposes must originate in the House of Representatives, but are subject to amendment by the Senate. The Senate has the sole power of trying impeachments, but it can only convict by a majority of two thirds of the members present, and its sentence extends only to removal from office and disqualification to hold any office of honor or profit under the U. S. It ratifies treaties and confirms certain presidential appointments. The regular meeting of Congress is on the first Monday in December, annually. Every bill which passes the two houses is sent to the President for approval or disapproval; in the latter case he returns it, with his reasons, to the house in which it originated; if on reconsideration it is passed again by a majority of two thirds in each house, it becomes law. The powers of Congress are limited, and separated from those of the state legislatures by the Constitution. In 1909 Congress consisted of ninety Senators and (under the apportionment on the 1900 Census) 386 Representatives. Practically all business of Congress is transacted by the various committees of the two houses. No person is eligible to the Senate under the age of thirty years, nor to the House of Representatives under the age of twenty-five. For a full state-

ment of the origin, character, and powers of Congress, see CONSTITUTION OF THE UNITED STATES.

Congres'sional Rec'ord, the printed journal of the proceedings of the U. S. Congress. Before 1799 all the proceedings of the Senate were secret, and "executive sessions" are still held with closed doors. The publication has had various names: *Annals of Congress,* 1789–1824; *Register of Debates,* 1825–37; *Congressional Globe,* 1834–74; since then the *Congressional Record.* The record is based upon accurate transcripts made by a corps of highly competent stenographers, but great latitude is allowed members in revising speeches, and obtaining "leave to print" speeches not delivered, and in spreading on the records matters which they desire to get before their constituencies without paying postage thereon, as the *Record* is reprinted at a nominal rate, and goes through the mails under the franking privilege.

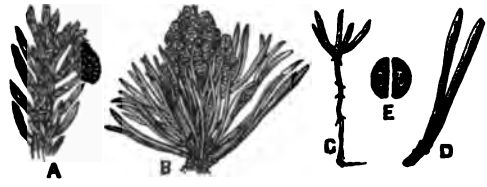
Congress, Li'brary of. See LIBRARY OF CONGRESS.

Con'gressman at Large, member elected to the national House of Representatives by the voters of the entire state, instead of by those of a district in accordance with the ordinary plan. This mode of election is necessitated by changes in the apportionment after each decennial census. Thus by the Act of February 7, 1891, a new apportionment was made of members of that House, the number being fixed at 356. A specific number of members was assigned to each state. It was then provided that in each state entitled under the apportionment to more than one Representative the number to which such state might be entitled in the Fifty-third and each subsequent Congress should be elected by districts composed of contiguous territory, and containing as nearly as possible an equal number of inhabitants, the number of such districts equaling the number of Representatives to which the state is entitled; but "in case of an increase in the number of Representatives which may be given to any state under this apportionment, such additional Representative or Representatives shall be elected by the state at large, and the other Representatives by the districts now prescribed by law, until the legislature of such state in the manner herein prescribed shall redistrict such state." This apportionment went into effect March 3, 1893. The Fifty-ninth Congress (1905–7) had ten Congressmen at Large; the Sixtieth (1907–9) nine.

Con'greve, William, 1670–1729; English dramatic poet; b. near Leeds; in 1693 made a success with his first play, "The Old Bachelor," performed at Drury Lane. The next year "The Double Dealer," a better play, was received unfavorably. In 1694 he produced a comedy called "Love for Love," which added much to his fame and fortune, and in 1697 "The Mourning Bride," a tragedy, which was greatly admired.

Con'ic Sec'tions, in mathematics, the sections of a right cone by a plane. If the cutting plane is perpendicular to the axis, the section is a circle; if it is parallel to one side of the cone, the section is a parabola; if it makes a greater angle with the base than is made by the side of the cone, the section is a hyperbola; if it makes a less angle with the base than the side does, the section is an ellipse. A perpendicular plane through the apex is a triangle. The study of conic section is specially important on account of its connections with the laws of moving bodies. The orbits of planets, the paths of projectiles, the undulations of light and sound are all either circular, elliptic, parabolic, or hyperbolic.

Con'ifer, or Pine Fam'ily, any member of the order of woody plants (*Coniferæ,* class *Gymnospermæ*), characterized (1) by having hard woody stems consisting of pith, wood, and bark, and which increase in diameter by the growth of layers of wood and bark, the former outside and the later inside of the older growths; (2) by the development of



STRUCTURE OF THE PINE (*Pinus sylvestris*). A. young ovuliferous cone. B. A cluster of polleniferous cones. C. A young plant. D. Two leaves. E. Sections of two leaves, enlarged.

the seed upon an open bract or scale. The branches usually spring horizontally from the trunk and become shorter toward the top so that the tree has the shape of a cone. In many cases the seed-bearing scales are in compact "cones," as in the pines, spruces, firs, etc. Many of the species are evergreen, hence they bear the popular name of "evergreens."

The conifers constitute a very old order of plants, having originated in Devonian or Subcarboniferous times. At present there are about 350 species, widely distributed throughout the world in the temperate zones, representing thirty-four genera, which are often widely separated, through the disappearance of related older forms. They are grouped in two families, *Taxaceæ* (without cones), and *Pinaceæ* (with cones). See FIR, NUTMEG, PINE, YEW.

Co'nium. See HEMLOCK.

Conjuga'tion, process occurring among the lower forms of organic life, in which the substance of two distinct organisms, coming into contact, is passed into a single mass. In plants it is always attended with reproduction, sometimes also in animals. It has been observed in numerous algæ and in some fungi.

Conjunc'tion, aspect of a planet when it is in or near the same straight line with the earth and the sun. When between the earth and the sun, it is said to be inferior; if beyond the sun so that the latter is the central body of the three, or if outside the earth so

that the latter is the central body, the conjunction is called superior. Owing to the inclination of the planes of the several orbits, the three bodies are never mathematically in the same straight line.

Conk'ling, Roscoe, 1829–88; American statesman; b. Albany, N. Y.; removed to Utica, N. Y., to practice law, 1846; District Attorney of Oneida Co., 1850; Mayor, 1858; Representative in Congress, 1859–63 and 1865–67; U. S. Senator, 1867–81; resigned because of dispute with Pres. Garfield concerning Federal patronage in New York State; joined by his colleague, Thomas C. Platt; both Senators were candidates in legislature for reëlection, but were defeated; practiced law in New York City till his death.

Throughout the war he was a stanch supporter of the administration, figuring prominently from the first in debates and on committees. As Senator he took an active part in the reconstruction of the S. states, opposed Pres. Johnson's policy, and zealously championed Grant's administration, even advocating his nomination for a third term, 1880.

Connaught (kŏn'ât), **Arthur William Patrick Albert** (Duke of), 1850– ; Prince of the United Kingdom, Duke of Saxony, Prince of Coburg and Gotha; b. Buckingham Palace; third son of Queen Victoria; entered the military Academy at Woolwich, 1866; becoming general of brigade, 1880; created Duke of Connaught and Strathearn and Earl of Sussex, 1874; married Princess Louise Margaret of Prussia, the grandniece of Emperor William I of Germany, 1879.

Connecticut (kŏn-nĕt'ĭ-kŭt), named from its chief river; called the NUTMEG STATE, and "the Land of Steady Habits"; state flower, the mountain laurel; state in the N. Atlantic division of the N. American union; area, 4,990 sq. m.; length from E. to W. 86 m.; average breadth, 55 m.; pop. (1906) 1,005,716; capital, Hartford; surface traversed by ranges of hills, with no great elevations; chief rivers, the Connecticut, Housatonic, and Thames, all navigable to the head of tidewater; numerous falls on the smaller streams afford abundant waterpower. The river valleys are generally fertile; mineral products include copper and lead, both combined with silver; bog iron ores, hematite in the N. yielding excellent iron and nickel; limestone, marble, brownstone (old red sandstone), flagstones, granite, gneiss, hydraulic lime, barytes (heavy spar), verd antique, tiling slate, fire clay and Kaolin; fruits and market vegetables are produced abundantly; dairy cattle and sheep farming favorite pursuits.

The climate is not so harsh in winter as that of the states bordering on the ocean; the state is generally healthful. Its manufactures excel in variety those of any other state; number of industries (1900) 9,128; establishments (1905), 3,477; capital, $373,283,580; value of products, $369,082,591. The state is noted for its public-school system; has many collegiate schools and seminaries, and three higher institutions, Yale Univ., at New Haven; Trinity College, at Hartford, and Wesleyan Univ., at Middletown; leading religious denomination, the Congregational. The chief towns are: Hartford, New Haven, Bridgeport, Waterbury, New Britain, Meriden, New London, Norwich, Danbury, Stamford.

The first settlement in Connecticut was made by the Dutch, 1633; first permanent settlement by English from Plymouth, Mass., at



Tunxis (Windsor), 1633; union of Hartford, Windsor, and Wethersfield, 1637; war with Pequot Indians, 1637; settlement of New Haven, 1638, which with adjacent towns remained a separate colony till 1665, when it united with the river towns making up the Connecticut colony; annual sessions of the General Court or Legislature held alternately in Hartford and New Haven, 1701–1875; attempt by Sir Edmund Andres to obtain colony's charter, 1687, was unsuccessful; state ratified the U. S. Constitution, January 9, 1788.

Connecticut, river of the U. S.; rises in the extreme N. part of New Hampshire, near the frontier of Canada. Its W. bank forms the entire boundary between New Hampshire and Vermont. It flows in a general SSW. direction until it enters Franklin Co., Mass.; intersects Massachusetts and Connecticut, flowing nearly S. to Middletown, Conn., below which its course is SE., and enters Long Island Sound at Saybrook; length about 450 m. The valley of the Connecticut is celebrated for the beauty of its scenery, the fertility of its soil, and the luxuriant growth of the tobacco plant known as the Connecticut seed leaf, used principally as wrappers in making cigars. It is not uncommon for the crop to exceed 2,000 lbs. to the acre. The head of steamboat navigation is at Hartford, about 50 m. from its mouth; principal affluents, the Deerfield, Farmington, and Chicopee rivers.

Connec'tive Tis'sue, in histology, a large and important group of tissues, which have in common an origin from the mesodermic tract of the embryo; they seem to differ widely, but their variations depend chiefly upon differences in the physical character of the intercellular

portion of the adult tissue rather than upon any inherent difference in the nature of the tissues themselves. This group may be divided into:

1. Loose connective tissues, represented by the subcutaneous and intermuscular tissues as well as by those uniting organs with surrounding structures and supporting their essential parts. It consists of many bundles of white fibrous tissues loosely fitted together.

2. Dense connective tissue, occurring as the densely felted structures forming the ligaments, tendons, and denser parts of various organs, as the outer coat of the eye.

3. Modified connective tissues, of which fat is an important representative, others being pigmented tissue, hyaline or glassy membranes.

4. Cartilage, in which the intercellular substance is still further condensed, the fibers being fused together by a cementing material into a ground substance or matrix which varies from being distinctly fibrous to apparently homogeneous in character, and containing no blood vessels, lymphatics, or nerves. Yellow elastic cartilage, found on the skin, vocal cords, etc., can be stretched to over twice its length before breaking.

5. Bone and dentine, in which group the connective tissues reach their greatest density and hardness, since they are impregnated with lime salts.

The cellular elements of connective tissues are of two kinds: the connective-tissue cells proper or fixed cells, and the wandering cells, whose presence within these tissues is but an incident in their migrations. The wandering cells are small amœboid elements, which, while partly originating from the division of connective-tissue cells, are chiefly derived from the blood and lymph as migrated white blood cells.

Co'non, Athenian general; entered public life abt. 413 B.C.; one of the ten generals chosen, 407; defeated by Lysander at Ægospotami, 405; commanded the combined fleets of Persia and Athens which defeated the Spartans at Cnidos, 394 B.C.; afterwards rebuilt the Long Walls of Athens.

Conon of Sa'mos, Greek geometer and astronomer; was a friend of Archimedes, who expressed a high estimation of his sagacity; lived at Alexandria abt. 250 B.C.; invented the curve called the spiral of Archimedes.

Con'rad, name of several rulers of Germany, the most important of which follow: CONRAD I, d. 918 A.D.; Emperor of Germany; elected, 911; previously Duke of Franconia, and related to the Carlovingian house; waged war against Henry the Fowler, of Saxony, from whom he conquered Thuringia; Charles the Simple, of France, from whom he conquered Alsace and Lorraine; and Arnulf of Bavaria, whom he drove into Hungary; was killed in a battle against the Magyars. CONRAD II, called THE SALIC, d. 1039; King of Germany and Roman Emperor; son of Henry, Duke of Franconia; elected King of Germany, 1024; crowned as emperor by the pope, 1027; is said to have been the author of the written feudal law of Germany; succeeded by his son Henry III. CONRAD III, 1093–1152; King of Germany; the first of the Hohenstaufens and a grandson of Henry IV; elected emperor, 1138; waged war against Henry the Proud, Duke of Saxony; led a crusade, 1147; excited by St. Bernard of Clairveaux, took the cross and hastened to Asia Minor at the head of a splendid armament, but his plans were foiled by the treachery of Manuel Comnenus, the Greek Emperor; besieged Damascus without success, and returned, 1149; succeeded by Frederick Barbarossa. CONRAD IV, 1228–54; King of Germany; son of Frederick II; b. Apulia, in Italy; crowned King of the Romans, 1237, and on the death of his father, 1250, assumed the title of emperor; supported by the Ghibellines, but the pope and the Guelphs recognized his competitor, William of Holland. Conrad marched into Italy, 1251, and took Naples. CONRAD V, or CONRADIN, 1252–68; son and heir of Conrad IV. The Kingdom of Naples was usurped by his uncle Manfred; instigated by the pope, Charles of Anjou waged war against Manfred and conquered Naples. Conrad was captured at Tagliacozzo, 1268, by Charles, and at his order was beheaded; the last of the Hohenstaufen dynasty.

Consanguin'ity, in law, relationship by blood, or that subsisting between persons descending the one from the other, or from a common ancestor, distinguished from affinity (*q.v.*). It is lineal when one of the persons is descended from the other. It is collateral when they are descended from a common ancestor, and one is not descended from the other. There are two principal modes of reckoning collateral consanguinity. One method is to count the degrees intervening between the one farthest removed from the common ancestor and such ancestor. Thus the son of the nephew of A is related to A in the third degree, as being three removes from the common ancestor, the father of A. This is the method of the canon and common law. The civil law reckons the degrees from the one relative to the other, ascending, on the one hand, from one of the parties to the common ancestor, and then counting downward to the other. On that theory A would be related to the son of his nephew in the fourth degree. The civil-law method is generally employed in the U. S. In reckoning lineal consanguinity the two systems do not differ. Thus the father and son are related in the first degree, the grandfather and grandson in the second. It frequently becomes necessary to resort to these rules not only in considering the transmission of estates, but in ascertaining whether persons are by reason of relationship disqualified to act as judges or jurymen.

Conscience (kŏn'shĕns), the sense of right and wrong. The psychological theory of conscience turns upon the question of what the mind is concerned with when it has the sense of "ought" or "ought not." The intuitional theory claims that man has an inborn and perfect knowledge of the moral relations of actions, and only has to recognize the moral

quality when he sees it. This theory is combated by another theory, which recognizes the gradual growth of the moral sense in the mind from incomplete beginnings up to the more adequate judgments which the adult possesses. The intuitionists, in view of the child's evident growth as a moral being, have divided into camps, one of which holds that conscience is a perfect faculty, and cannot grow or be educated, and the other admits that conscience grows more perfect as the child and race grow up, but says that it is always correct, even in the child, as far as it goes. To these latter, conscience is not based upon experience, but nevertheless profits by experience in its growth. On the other hand, the naturalists hold that conscience, like all other mental functions, is a product of evolution; that it has arisen in the development of the race on account of its social utility, and that each individual gets his conscience gradually by growing up into the system of social relationships which represent law and order to him. The naturalistic theory does not necessarily deny final authority to conscience, but only says that whatever its authority, it is, in its origin, not inborn, but a thing developed both by the race and by the individual. The idealistic theory holds generally to the opinion that conscience is capable of education and growth, but goes on to find in it the final statements of the real value system of the world and the foundation of philosophy.

Conscience (kŏn-sē-ŏnss'), **Hendrik,** 1812–83; Flemish novelist; b. Antwerp; served in the Belgian army, 1830–36; began to write for the Anti-French League, an association working to expel the French language from Belgium and to supplant it with Flemish as the literary language; although his novels were all written in Flemish ("The Lion of Flanders," "Jacob van Artevelde," "Valentyn," "The Lost Glove," etc.), they were widely read, and were translated into German, French, English, Danish, etc. The city of Antwerp erected a statue in his honor before his death.

Con'sciousness, the fundamental awareness which we have as beings having minds. The mere fact of awareness must be distinguished from the special functions and activities which go on *in* consciousness. Consciousness is the theater, the common background of mental events of all kinds. Instead of being a special power or activity, it is the common character of all the powers; it is present alike with them all, and is necessary to them. We are equally conscious when we know, when we act, and when we feel. All these take place in consciousness. Instead of perceiving mental events by consciousness, we are directly conscious of them as mental events; the consciousness is the aspect of the events which makes them mental; it underlies and so constitutes the very fact of mentality. Self-consciousness is a higher and more complex thing than consciousness. Children are conscious of their sensations, emotions, etc., long before they become conscious of self. So low animals undoubtedly have consciousness—the simple awareness that changes take place within their minds—without consciousness of personal self. To be conscious is simply to have something taking place in the mind; to be self-conscious is the attitude of a mind which mirrors its own processes, that thinks about its own thought, or is impressed by its own emotions. Consciousness is often used as synonymous with a certain usage of the term feeling, while the voluntary consciousness which shows deliberation and selection is assimilated to will.

Double consciousness is a peculiar mental condition in which a person is at one time governed by certain ideas and motives and manifests one form of character, while at other times he is swayed by other ideas and emotions, and by his manner and actions appears to be practically a different person. The conception has been carried to its extreme in Stevenson's story of "Dr. Jekyl and Mr. Hyde," in which the principal character, through the taking of some drug, is periodically transformed from a high-principled physician into a monster of criminal instincts. Allied conditions are found in trance subjects, epileptics, and somnambulists, while even the most single-minded individual may occasionally be inclined to follow the apostle's injunction to subordinate his usual point of view and be "all things to all men."

Con'script Fa'thers, the senators of ancient Rome, because, after the expulsion of Tarquin, when Brutus added another 100 to the number of senators, the names of the new members were "written together" with those of the old, and the whole body received the appellation of Conscript Fathers.

Conscrip'tion, compulsory enrollment of men for military service. This is the system by which the armies of some countries are recruited. The soldiers who are thus compelled to enter the army are called conscripts. Conscription obtained in France during the Revolution which began in 1789. The number required for the service is drawn by lot from the young, able-bodied men who are not exempt.

Consecra'tion, word with several applications: 1. The act or ceremony of separating a person or a thing from a profane to a sacred use. 2. The act by which a priest, duly and canonically chosen to "the office and administration of a bishop in the Church of God," receives the grace of the episcopate by the imposition of the hands of three bishops. 3. The act of the priest by which, at the Eucharist, by the recital of the words of institution and the use of the appointed manual acts, through the operation of the Holy Ghost, the offered bread and wine are sacramentally made the body and blood of Christ. 4. The act of a bishop or priest when setting apart for holy uses a church, an altar, the sacred vessels, vestments, etc.

Conserva'tion of Nat'ural Resour'ces, term used to cover the work of a national commission which has commenced the task of taking an account of the country's resources in water, land, forests, and minerals, in order not only to know what we have, but how long,

under the probable future rates of consumption, the supplies will last. With this are proceeding also studies of the best means whereby the drain may be lessened without injury to our industries, where waste may be stopped or reduced, and where products may be utilized more fully. The commission was appointed by Pres. Roosevelt on June 3, 1908, as a result of a conference to which he had invited the governors of all the states and territories, and which had as its object the consideration of the natural resources of the U. S. Another conference was held later in the year, and in February, 1909, Canada and Mexico were invited to join the U. S. in a "continental conference" at Washington.

Conserv'atives, in politics, those who oppose radical changes in institutions or laws. In England those formerly called "Tories" are now termed "Conservatives."

Conserv'atory, school or place of public instruction and training designed to conserve and promote the study of some branch of science or art, but more particularly music. Such schools are of ancient origin, and were probably founded by ecclesiastics for the purpose of improving the character of church music. They were originally charity schools, recruited from foundlings and orphans of both sexes. The first conservatory was the famous one of Santa Maria di Loreto in Naples, founded by Giovanni di Tappia in 1537.

Considera'tion, mature thought, serious deliberation, meditation; also motive of action, reason. In law, the material cause of a contract, the reason which induces a contracting party to make a contract. The leading distinction respecting considerations is that they are either good or valuable. A valuable consideration either confers some benefit on the promisor or causes some inconvenience or damage to the promisee. A good consideration is based upon relationship or natural love or affection, and is of avail only in an executed contract, *e.g.*, in case of a deed of land where it has been delivered. The term good consideration is also used in a broader sense, including valuable considerations, for any consideration sufficient to sustain a contract.

Consis'tory, place of meeting of the cabinet of the Roman emperors; name also applied to the council of cardinals (sometimes assisted by other prelates), who attend in person or by proxy, meeting in the Vatican palace to advise the pope. A court under this title for the regulation of discipline and worship, composed of civil and ecclesiastical jurists, was established by the Lutheran princes of Germany at the Reformation. The earliest was that of Wittenberg, founded 1537. The lower Church courts of the Reformed ("Dutch" and "German") churches in the U. S. are also called consistories.

Con'sols, a considerable portion of the funded debt of Great Britain, so called from the interest, which was termed "consolidated annuities." This debt was contracted by loans negotiated at different times and at various rates of interest. To obviate the confusion which arose from the variety of stocks thus created, they were consolidated into one fund, 1750–57. Consols, or the consolidated three per cents, were converted in 1888 into consolidated stock bearing 2¾ per cent interest until 1903 and 2½ per cent thereafter.

Con'sonance, in music, a combination of notes sounding together smoothly, without any of the harshness produced by the interference of beats. Such beats, as has been long known, are produced by the coincidence or opposition of the overtones, which almost always accompany the fundamental notes. There is but one chord of consonances in music, namely, the common chord, being a bass note with its third, fifth, and octave. The consonances of the unison, the octave, the fifth, and fourth are called perfect. The imperfect are the major and minor thirds and the major and minor sixths.

Conspiracy (kŏn-spĭr'ă-sē), in criminal law, a combination by two or more persons to do an unlawful act, or to do something not in itself unlawful by criminal or unlawful means. Recent legislation in the U. S. on such combinations has been intended to prevent members of labor unions from combining against employers to force concessions by strike or boycott.

Con'stable, John, 1776–1837; English landscape painter; b. E. Bergholt; was not appreciated in England, but recognized as a master in France. The modern French school of landscape painting is founded on Constable. His works include "Cornfield," 1826; "The Valley Farm," 1835; and "Barnes Common." His pictures are wonderfully harmonious in tone.

Constable, officer of many of the mediæval monarchies, particularly France, England, and Scotland, of high military and judicial rank. The office at first was one of comparative insignificance, but its importance gradually increased until the constable became *ex-officio* commander in chief of the army, the supreme military judge, and chief arbitrator in questions of chivalry. In France, Mathieu de Montmorenci, constable in 1218, was the first who had the supreme command. The office was abolished, 1627. Napoleon I appointed his brother Louis constable of the empire, and Berthier vice constable. Under the Restoration the dignity was again abolished. In England, Henry VIII, finding the fees of the office burdensome to the crown, discharged the Duke of Buckingham from the office, 1514, and since that date a lord high constable has been appointed only for occasions of great state ceremonies, such as a coronation. In Scotland the office has been hereditary in the family of Hay (Earls of Errol) since 1314, but without its ancient powers.

Con'stance, city of Baden, Germany; on the Rhine and the SW. shore of the Lake of Constance; 35 m. NE. of Zurich; is one of the oldest towns in Germany; was formerly a free imperial city; has a magnificent cathedral,

founded in the eleventh century; manufactures of silk and cotton goods and watches. An important concordat of the Church was named from Constance. Pop. (1901) 21,345.

Constance, Coun'cil of, ecumenical council of the Roman Catholic Church, the seventeenth in order of occurrence; convened by writ of the German Emperor Sigismund, with the consent and concurrence of John XXIII, and opened on All Saints' Day, 1414, by John XXIII, one of the three claimants of the papacy. There were present during parts of the session, besides the emperor, seven patriarchs, twenty-one cardinals, one hundred and fourteen bishops and archbishops, besides many princes, nobles, and ambassadors from most of the Catholic powers and from the Greek emperor, Michael Palæologus. Representatives were also present from the principal universities of Europe. One of the objects of this council was the ending of the schism caused by the rival popes (John XXIII, Gregory XII, and Benedict XIII). This object was accomplished by the deposition of John XXIII and Benedict XIII, the voluntary abdication of Gregory XII, 1415, and the election of Martin V in their stead. The council also condemned the opinions of Wyclif and Huss, and cited the latter to appear before it (1414).

Constance, Lake of, lake of central Europe; borders on Baden, Bavaria, Switzerland, the Tyrol, and Würtemberg; 1,290 ft. above sea level; area, 184 sq. m.; abt. 40 m. long, and 9 m. wide at the broadest part; greatest depth, 912 ft. The Rhine enters this lake near the SE. end, and issues from the NW. extremity.

Con'stans, Flavius Julius, abt. 320–350 A.D.; Emperor of Rome; third son of the Emperor Constantine I, on whose death (337) he became the sovereign of Italy, Africa, etc. His brother Constantine invaded Italy, and was killed in battle (340), after which Constans was master of the W. Empire; was defeated and killed by Magnentius.

Constans (kôn-stäń'), **Jean Antoine Ernest,** 1833– ; French politician; b. Beziers; professor of law in Toulouse; republican member, Chamber of Deputies, 1876; Minister of the Interior, 1880–82; Minister to China, 1885–87; Governor General of Indo-China, 1887–88; elected senator, 1889; Minister of the Interior, 1889–92. His vigorous measures overthrew Boulangism.

Constant, Jean Joseph Benjamin. See BENJAMIN-CONSTANT, JEAN JOSEPH.

Constant de Rebecque (dė rė-bėk'), **Henri Benjamin,** 1767–1830; French political writer; b. Lausanne; settled in Paris, 1795, where he joined the moderate republican party, but, having become obnoxious to Napoleon, was expelled from the tribunate, 1802, and spent several years in Germany; returned to France after the overthrow of Napoleon; aided in placing Louis Philippe on the throne; principal political works, "On the Spirit of Conquest" and "Usurpation," and "Course of Constitutional Policy"; principal philosophical works, "On Religion, Considered in its Sources, Forms, and Developments," and "Religion of Rome."

Con'stantine, name of the thirteen emperors of the E. or W. sections of the Roman Empire, the most important of whom follow: CONSTANTINE I, CAIUS FLAVIUS VALERIUS AURELIUS CLAUDIUS, surnamed THE GREAT, 274–337; Emperor of Rome; son of Constantius Chlorus, who succeeded Maximian as Emperor of the W., 305, and died in Britain, 306. The army immediately proclaimed Constantine, but Galerius, the successor of Diocletian in the E., appointed Severus Emperor of the W. Severus had to struggle at Rome against Maximian's son Maxentius, and Maximian himself again laid claim to the purple. Overcome by his own son, the latter, after causing the assassination of Severus, fled to Constantine, to whom he promised the succession. Constantine, finding him a treacherous ally, compelled him to commit suicide (310), and led his legions to Rome, where he was received as emperor, Maxentius having been accidentally drowned. During this campaign Constantine had the cross placed on his banner. By him Licinius, who after the death of Galerius had defeated his successor Maximian and become Emperor of the E., was defeated (323) and treacherously put to death. Other victims of the ambition or passion of Constantine were his own son Crispus; his nephew, the son of Licinius, and, lastly, his wife Fausta. As early as 312 Constantine granted absolute toleration to Christianity, and at the Council of Nice (325) declared it the official religion of the empire. In 330 the capital was removed from Rome to Byzantium, thereafter called Constantinople. CONSTANTINE IV, surnamed POGONATUS; d. 685; son of Constans II; succeeded 668; defended Constantinople, blockaded by strong Arabian fleet, with newly invented Greek fire, 672; defeated Arabs after long campaign; called council which condemned the Monothelites, 680; succeeded by his son Justinian II. CONSTANTINE V, surnamed COPRONYMUS, 719–775; Emperor of the E.; son of Leo III; succeeded 741; defeated Artavasdes, who had occupied the capital, 743; assembled council which condemned worship of images; was an iconoclast ("image breaker") and persecutor of the orthodox; succeeded by his son Leo IV. CONSTANTINE XIII, PALÆOLOGUS, 1394–1453; last Emperor of Constantinople; son of Manuel II; succeeded his brother John VII, 1448; under him Constantinople was besieged and taken by storm by the Turkish sultan, Mohammed II, and he was killed while fighting at the walls.

Constantine, Nikolaevitch, 1827–92; Grand Duke of Russia; second son of Emperor Nicholas; grand admiral of the fleet and a favorite leader of the old Russian party; commanded the Baltic fleet in the Crimean War, 1854–55, and acted on the defensive; Governor General of Poland, 1862–63; president of the Council of State, 1865–81; was dismissed from office and from command of the fleet on suspicion of intriguing with the revolutionary party.

Constantine, Pavlovitch, 1779–1831; Grand Duke of Russia; second son of Emperor Paul;

commanded a corps at the battle of Austerlitz, 1805, and displayed in several actions a courage bordering on rashness; generalissimo of the Polish troops and Viceroy of Poland, 1814. When Alexander died without issue, 1825, Constantine was the legitimate heir, but he renounced the throne in favor of his younger brother Nicholas. In the reign of Nicholas, Constantine was Viceroy of Poland, and by his tyranny provoked the Poles to revolt, 1830.

Constantine, city of Algeria; capital of province of same name; on a high hill flanked on three sides by ravines; over 2,000 ft. above sea level; is surrounded by walls built by the Arabs, and has been greatly improved, resembling a modern French town with broad streets; is the seat of a Roman Catholic bishopric, and has manufactures of woolen cloth and saddlery. Remains of the ancient Roman *Cirta*, which was a great city of Numidia, are visible; besieged by the French, 1836; taken by assault, 1837. Pop. (1901) 66,302.

Constantino'ple, "Constantine's city," in Turkish ISTAMBOUL or STAMBOUL, ancient *Byzantium*, capital of the Ottoman Empire; on the Sea of Marmora, at the SW. extremity of the Thracian Bosporus. The city, entirely surrounded by walls, occupies a triangular peninsula, having the Golden Horn, an excellent harbor, an inlet of the Bosporus, on the N. Two pontoon bridges across this inlet connect the city proper with the populous suburb of Galata-Pera, where foreigners reside and the European legations and embassies are located. Constantinople spreads over seven hills; the largest is cut off from the rest by the river Lycos, which traverses the city. This diversified surface, covered with numerous palaces, mosques, minarets, gardens, and cypresses, presents an aspect marvelously picturesque and distinctively Oriental in spite of the quays, tramways, omnibuses, and telegraph wires. Its commanding geographical situation renders Constantinople the key of E. Europe and Asia Minor.

The government buildings are generally unpretentious; outside the offices of the grand vizier is the elaborate gate from which the government takes the name of the Sublime Porte. The Grand Bazaar consists of connected covered streets, lined with three thousand two hundred and seventeen little shops, and is the city's commercial center, and its most Oriental feature. The inhabitants of Constantinople and suburbs, according to recent estimates, number abt. 1,125,000. About one half are Ottoman, the other half Greeks, Armenians, Jews, Levantines, etc. The principal foreign nations have their own post offices, newspapers, hospitals, and schools. Native schools are numerous, one being attached to every mosque and church, but not generally of a high order. The government maintains good naval, military, medical, and polytechnic schools, and a university was nominally founded, 1900. Manufactures hardly exist, and since 1878 the importance of Constantinople as a commercial center has been largely transferred to Batoum, Odessa, and Smyrna. Shipping is almost entirely in the hands of foreigners; exports: wool, raw silk, carpets, tobacco, rags, hides, and valonia; imports: grain, sugar, coffee, cattle, drugs, and all kinds of manufactured articles.

Constantine founded Constantinople on the site of Byzantium, with largely increased territory, and dedicated it May 11, 330, "to the service of Christ." Since then, though besieged thirty-one times, it has been captured only twice, by the Latin crusaders (1203–4) and by Mohammed II (1453).

Constantinople, Coun'cils of. (1) The second general council of the Church, convened in 381 by the Emperor Theodosius. It confirmed the election of Gregory Nazianzen as bishop of Constantinople, reaffirmed the faith of Nice and the condemnation of the Macedonian and other heresies, and regulated the discipline of the E. churches. (2) The fifth general council, convened (553) by Justinian, to obtain the condemnation of the so-called "three chapters," *viz.*, the writings of Theodore of Mopsuestia, of Theodoret of Cyrrhus, and of Ibas of Edessa, against all of which Justinian had issued a decree (546) at the instigation of the Monophysite bishop, Theodore Ascidas of Cæsarea, and the Empress Theodora. This had led to a question of jurisdiction between the emperor and Pope Vigilius, and the controversy had spread further, and produced a schism. To remedy this evil the fifth general council was called. Vigilius refused to preside, but delivered a separate sentence, milder than that of the council, condemning errors rather than persons. (3) The sixth general council, 680–81. It condemned the Monothelite heresy. (4) The eighth general council, 869. It condemned Photius, and also the iconoclasts.

Constan'tius I, or Constantius Chlo'rus, Flavius Valerius, 250–306; Roman emperor; father of Constantine the Great. The emperors Diocletian and Maximian chose Constantius and Galerius, 292 A.D., and gave to each the title of cæsar. Constantius ruled over Gaul, Britain, and Spain, and became emperor, 305, when Diocletian abdicated.

Constantius II, Flavius Julius, 317–61; second son of Constantine I and Fausta; b. Sirmium; inherited the Asiatic provinces and Egypt, 337; waged war against the Persians, by whom he was several times defeated; vanquished Magnentius on the Drave, 351, and in Gaul, 353. In 355 he gave the title of cæsar to his cousin Julian, who succeeded him. He showed favor to the Arians.

Constella'tion, group or collection of stars. The use of the term has arisen from the fact that the stars are not scattered equally over the heavens, but appear to be collected into groups. In early times names were given to these groups, suggested by a fancied resemblance to figures of men, animals, or other objects. It would seem from Ptolemy's descriptions of the stars and his list of the constellations, that long before his time maps of the stars were formed on which the animals, heroes, or objects after which the constellations

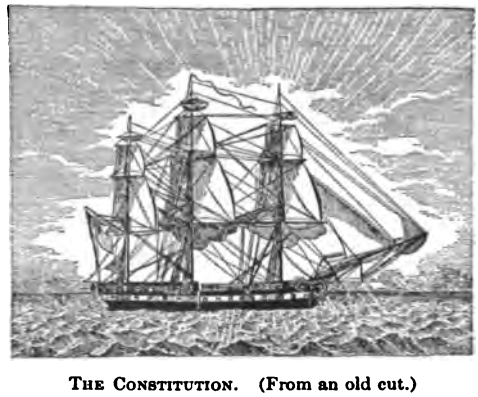
were named were drawn so as to include all the brighter stars of each constellation. The latter were then designated by the particular part of the man, animal, or object where the star was situated. For example, Aldebaran was in the eye of the bull; three conspicuous stars in Orion formed his belt; a small group formed his head; two bright stars were in his shoulder, etc. Ptolemy in the Almagest recognizes thirty-six constellations. In modern times fifty-six have been added to Ptolemy's list. At the present time the figures of animals are no longer used, but the entire heavens are divided up into regions bounded by somewhat arbitrary lines, straight or curved, drawn so as to pass through the spaces containing as few conspicuous stars as possible. Within each constellation the brighter stars are distinguished by numbers, or by letters of the Greek alphabet.

The following list comprises all the constellations now recognized, although some of the more recent ones are understood to be temporary. The first twenty are known as Ptolemy's N. constellations; next come the twelve zodiacal, and then the fifteen S. constellations of Ptolemy; the forty-eighth was added by Tycho Brahe, though first named by Conon the Samian; the next ten are from Hevelius. All after the fifty-fifth are S. of the equator. See STAR.

1. Ursa Minor, the Lesser Bear.
2. Ursa Major, the Greater Bear.
3. Draco, the Dragon.
4. Cepheus.
5. Boötes, the Herdsman.
6. Corona Borealis, the Northern Crown.
7. Hercules.
8. Lyra, the Lyre.
9. Cygnus, the Swan.
10. Cassiopeia.
11. Perseus.
12. Auriga.
13. Ophiuchus or Serpentarius, the Serpent-bearer.
14. Serpens, the Serpent.
15. Sagitta, the Arrow.
16. Delphinus, the Dolphin.
17. Equuleus, the Little Horse.
18. Pegasus, the Winged Horse.
19. Andromeda.
20. Triangulum Boreale, the Northern Triangle.
21. Aries, the Ram.
22. Taurus, the Bull.
23. Gemini, the Twins.
24. Cancer, the Crab.
25. Leo, the Lion.
26. Virgo, the Virgin.
27. Libra, the Scales.
28. Scorpio, the Scorpion.
29. Sagittarius, the Archer.
30. Capricornus, the Goat.
31. Aquarius, the Water-bearer.
32. Pisces, the Fishes.
33. Cetus, the Whale.
34. Orion.
35. Eridanus, the River Po.
36. Lepus, the Hare.
37. Canis Major, the Greater Dog.
38. Canis Minor, the Lesser Dog.
39. Argo, the Ship Argo.
40. Hydra, the Water Serpent.
41. Crater, the Cup.
42. Corvus, the Crow.
43. Centaurus, the Centaur.
44. Lupus, the Wolf.
45. Ara, the Altar.
46. Corona, Australis, the Southern Crown.
47. Piscis Australis, the Southern Fish.
48. Coma Berenices, the Hair of Berenice.
49. Canes Venatici (the Greyhounds, Asterion and Chara).
50. Lacerta, the Lizard.
51. Lynx, the Lynx.
52. Sextans Uraniæ, Tycho's Sextant.
53. Cameleopardalis, the Giraffe.
54. Vulpecula et Anser, the Fox and Goose.
55. Leo Minor, the Lesser Lion.
56. Monoceros, the Unicorn.
57. Indus, the Indian.
58. Grus, the Crane.
59. Phœnix, the Phœnix.
60. Musca, the Fly.
61. Pavo, the Peacock.
62. Toucan, the Toucan.
63. Hydrus, the Water Snake.
64. Dorado, the Swordfish.
65. Piscis Volans, the Flying Fish.
66. Chameleon, the Chameleon.
67. Triangulum Australe, the Southern Triangle.
68. Apus, the Bird of Paradise.
69. Apparatus Sculptoris, or Sculptor, the Sculptor's Workshop.
70. Fornax Chemica, the Chemical Furnace.
71. Horologium, the Clock.
72. Recticulum Rhomboidale, the Rhomboidale Net.
73. Cœla Sculptoris, the Graving Tools.
74. Equus Pictorius, the Painter's Easel.
75. Antlia Pneumatica, the Air-pump.
76. Octans, the Octant.
77. Norma, the Square-rule.
78. Circinus the Compasses.
79. Telescopium, the Telescope.
80. Microscopium, the Microscope.
81. Mons Mensæ, the Table Mountain.
82. Crux Australis, the Southern Cross.
83. Columba Noachi, Noah's Dove.

Constipa'tion, a state of the rectum in which it is impacted with fecal matter; the diseased condition in which there is sluggish action of the bowels. The principal causes which lead to constipation are sedentary habits and errors in diet, and a general sluggish condition of the system. There may be special want of secretion of the intestinal juices due to diseases of the intestines, and mechanical constipation may result from narrowing or compression of localized parts of the bowels. Headache, drowsiness, or loss of appetite are frequent symptoms. Obstinate constipation may lead to fermentative changes in the intestines and absorption of products of fermentation which are poisonous to the system. In the treatment of this affection regulation of diet and of exercise claim first attention. Indiscriminate drugging is more frequently harmful than otherwise. The diet should be varied, and should contain food such as brown bread, oatmeal, fruit and vegetables containing slightly irritating refuse. Regular exercise and a morning bath followed by vigorous friction are good. Obstinate cases may call for enemata of water, etc.

Constitu'tion, popularly called "OLD IRONSIDES"; frigate of the U. S. navy; built in Boston, 1797–98; first commander, Capt. Isaac Hull; had a running fight for three days and nights, July 17–20, 1812, with five British ves-



THE CONSTITUTION. (From an old cut.)

sels, but escaped; captured the *Guerrière*, one of these ships, August 19, 1812, and the frigate *Java*, December 29th; captured the *Picton*, February 14, 1814, and the *Cyane* and *Levant*, February 15th; afterwards a school-ship; later a receiving ship at Portsmouth, N. H., and sent to the navy yard, Boston. An attempt to dismantle and sell her, 1830, inspired the patriotic protest of Holmes's "Old Ironsides."

Constitution, in the U. S., a written statement of the fundamental rules of government, either of a state or of the U. S. It is often called the organic law. The word as thus used has a widely different signification from that which prevails in Great Britain, where it means the established general principles and organization of government, whether or not established by documentary prescription. The British constitution thus consists of documents emanating from time to time from the sovereign or from Parliament, and of traditions and customs. These may be collected in treatises and reduced to a systematic form, but have never received the sanction indispensable in the U. S.—that of stated recognition by the nation as distinguished from Parliament. In the U. S. "the people," consisting in each state of those who hold the elective franchise, are by prescribed forms called on at intervals either to establish their state constitution or to amend it. It thus has an authority superior to that of the government organized under it. One important result is that if any of the departments exceed the limits marked out in the Constitution, the act is irregular and void. An illustration of the doctrine is found in an act of the legislature which transcends the Constitution; the judicial department will declare it void. The courts have no such power in Great Britain. An act of Parliament is commonly said to be "omnipotent"; there is no judicial power which can exercise the function of arresting the regular operation of the act. The power of the courts in the U. S. is, in the best sense of the word, a "veto"—forbidding a direction which has actually been clothed with legislative forms from being carried into effect, on account of its repugnance to provisions of the Constitution.

Constitution of the Unit'ed States, organic law of the union of the states. The first constitution was the Articles of Confederation, adopted during the War of the Revolution. This proved inefficient for the accomplishment of the objects of the union; Congress authorized a convention to remedy the obvious defects; this convention was held in Philadelphia, May 14–September 17, 1787, and drew up the subjoined Constitution, which was adopted by a sufficient number of the states for it to go into operation, 1789.

CONSTITUTION OF THE UNITED STATES.

We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the U. S. of America.

ARTICLE I., Section 1. All legislative powers herein granted shall be vested in a Congress of the U. S., which shall consist of a Senate and House of Representatives.

Sec. 2. The House of Representatives shall be composed of members chosen every second year by the people of the several states, and the electors in each state shall have the qualifications requisite for electors of the most numerous branch of the state legislature.

No person shall be a representative who shall not have attained to the age of twenty-five years, and been seven years a citizen of the U. S., and who shall not, when elected, be an inhabitant of that state in which he shall be chosen.

Representatives and direct taxes shall be apportioned among the several states which may be included within this Union according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the U. S., and within every subsequent term of ten years, in such manner as they shall by law direct. The number of representatives shall not exceed one for every 30,000, but each state shall have at least one representative; and until such enumeration shall be made the State of New Hampshire shall be entitled to choose three, Massachusetts eight, Rhode Island and Providence Plantations one, Connecticut five, New York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

When vacancies happen in the representation from any state, the executive authority thereof shall issue writs of election to fill such vacancies.

The House of Representatives shall choose their Speaker and other officers, and shall have the sole power of impeachment.

Sec. 3. The Senate of the U. S. shall be composed of two Senators from each state, chosen by the legislature thereof, for six years; and each senator shall have one vote.

Immediately after they shall be assembled in consequence of the first election, they shall be divided as equally as may be into three classes. The seats of the Senators of the first class shall be vacated at the expiration of the second year, of the second class at the expiration of the fourth year, and of the third class at the expiration of the sixth year, so that one third may be chosen every second year; and if vacancies happen by resignation, or otherwise, during the recess of the legislature of any state, the executive thereof may make temporary appointments until the next meeting of the legislature, which shall then fill such vacancies.

No person shall be a Senator who shall not have attained to the age of thirty years, and been nine years a citizen of the U. S., and who shall not, when elected, be an inhabitant of that state for which he shall be chosen.

The Vice President of the U. S. shall be President of the Senate, but shall have no vote, unless they be equally divided.

The Senate shall choose their other officers, and also a President *pro tempore*, in the absence of the Vice President, or when he shall exercise the office of President of the U. S.

The Senate shall have the sole power to try all impeachments; when sitting for that purpose, they shall be on oath or affirmation. When the President of the U. S. is tried, the Chief Justice shall preside; and no person shall be convicted without the concurrence of two thirds of the members present.

Judgment in cases of impeachment shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the U. S.; but the party convicted shall nevertheless be liable and subject to indictment, trial, judgment, and punishment, according to law.

Sec. 4. The times, places, and manner of holding elections for Senators and Representatives shall be prescribed in each state by the legislature thereof; but the Congress may at any time, by law, make or alter such regulations, except as to the places of choosing Senators.

The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall, by law, appoint a different day.

Sec. 5. Each House shall be the judge of the elections, returns, and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner and under such penalties as each House may provide.

Each House may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two thirds, expel a member.

Each House shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may in their judgment require secrecy, and the yeas and nays of the members of either House on any question shall, at the desire of one fifth of those present, be entered on the journal.

Neither House, during the session of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two Houses shall be sitting.

Sec. 6. The Senators and Representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the Treasury of the U. S. They shall in all cases, except treason, felony, and breach of the peace, be privileged from arrest during their attendance at the session of their respective Houses, and in going to and returning from the same; and for any speech or de-

bate in either House they shall not be questioned in any other place.

No Senator or Representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the U. S., which shall have been created or the emoluments whereof shall have been increased during such time; and no person holding any office under the U. S. shall be a member of either House during his continuance in office.

Sec. 7. All bills for raising revenue shall originate in the House of Representatives; but the Senate may propose or concur with amendments, as on other bills.

Every bill which shall have passed the House of Representatives and the Senate shall, before it becomes a law, be presented to the President of the U. S.; if he approve, he shall sign it; but if not, he shall return it, with his objections, to that House in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If after such reconsideration two thirds of that House shall agree to pass the bill, it shall be sent, together with the objections, to the other House, by which it shall likewise be reconsidered; and if approved by two thirds of that House, it shall become a law. But in all such cases, the votes of both houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each House respectively. If any bill shall not be returned by the President within 10 days (Sunday excepted) after it shall have been presented to him, the same shall be a law in like manner as if he had signed it, unless the Congress by their adjournment prevent its return, in which case it shall not be a law.

Every order, resolution, or vote to which the concurrence of the Senate and the House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the U. S.; and before the same shall take effect, shall be approved by him, or, being disapproved by him, shall be repassed by two thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

Sec. 8. The Congress shall have power to lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defense and general welfare of the U. S.; but all duties, imposts, and excises shall be uniform throughout the U. S.;

To borrow money on the credit of the U. S.;

To regulate commerce with foreign nations, and among the several states, and with the Indian tribes;

To establish a uniform rule of naturalisation and uniform laws on the subject of bankruptcies throughout the U. S.;

To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures;

To provide for the punishment of counterfeiting the securities and current coin of the U. S.;

To establish post offices and post roads;

To promote the progress of science and useful arts, by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries;

To constitute tribunals inferior to the Supreme Court;

To define and punish piracies and felonies committed on the high seas, and offenses against the law of nations;

To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water;

To raise and support armies, but no appropriation of money to that use shall be for a longer term than two years;

To provide and maintain a navy;

To make rules for the government and regulation of the land and naval forces;

To provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions;

To provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the U. S., reserving to the states respectively the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress;

To exercise exclusive legislation in all cases whatsoever over such district (not exceeding 10 m. square) as may, by cession of particular states and the acceptance of Congress, become the seat of the government of the U. S., and to exercise like authority over all places purchased by the consent of the legislature of the state in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings; and

To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution, in the government of the U. S., or in any department or officer thereof.

Sec. 9. The migration or importation of such persons as any of the states now existing shall think proper to admit shall not be prohibited by the Congress prior to the year 1808; but a tax or duty may be imposed on such importation, not exceeding $10 for each person.

The privilege of the writ of *habeas corpus* shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it.

No bill of attainder or *ex post facto* law shall be passed.

No capitation or other direct tax shall be laid, unless in proportion to the census or enumeration hereinbefore directed to be taken.

No tax or duty shall be laid on articles exported from any state.

No preference shall be given by any regulation of commerce or revenue to the ports of one state over those of another; nor shall vessels bound to or from one state be obliged to enter, clear, or pay duties in another.

No money shall be drawn from the treasury but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

No title of nobility shall be granted by the U. S.; and no person holding any office of profit or trust under them shall, without the consent of the Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign state.

Sec. 10. No state shall enter into any treaty, alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any bill of attainder, *ex post facto* law, or law impairing the obligation of contracts, or grant any title of nobility.

No state shall, without the consent of the Congress, lay any impost or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts, laid by any state on imports or exports, shall be for the use of the treasury of the U. S.; and all such laws shall be subject to the revision and control of the Congress.

No state shall, without the consent of Congress, lay any duty of tonnage, keep troops or ships of war in time of peace, enter into any agreement or compact with another state or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II., Sec. 1. The executive power shall be vested in a President of the U. S. of America. He shall hold his office during the term of four years, and, together with the Vice President, chosen for the same term, be elected as follows:

Each state shall appoint, in such manner as the legislature thereof may direct, a number of electors, equal to the whole number of Senators and Representatives to which the state may be entitled in the Congress; but no Senator or Representative, or person holding an office of trust or profit under the U. S., shall be appointed an elector.[1]

The Congress may determine the time of choosing the electors, and the day on which they shall give their votes; which day shall be the same throughout the U. S.

No person, except a natural-born citizen, or a citizen of the U. S. at the time of the adoption of this Constitution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of 35 years, and been 14 years resident within the U. S.

In case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice President, and the Congress may by law provide for the case of removal, death, resignation, or inability, both of the President and Vice President, declaring what officer shall then act as President, and such officer shall act accordingly, until the disability be removed, or a President shall be elected.

The President shall, at stated times, receive for his services a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected, and he shall not receive within that period any other emolument from the U. S., or any of them.

Before he enter on the execution of his office, he shall take the following oath or affirmation: "I do solemnly swear (or affirm) that I will faithfully execute the office of President of the U. S., and will, to the best of my ability, preserve, protect, and defend the Constitution of the U. S."

Sec. 2. The President shall be commander in chief of the army and navy of the U. S., and of the militia of the several states, when called into the actual service of the U. S.; he may require the opinion, in writing, of the principal officer in each of the executive departments upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and

[1] This mode of election of President and Vice President has been modified by the 12th Amendment.

pardons for offenses against the U. S., except in cases of impeachment.

He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two thirds of the Senators present concur; and he shall nominate and, by and with the advice and consent of the Senate, shall appoint ambassadors, other public ministers and consuls, judges of the Supreme Court, and all other officers of the U. S., whose appointments are not herein otherwise provided for, and which shall be established by law; but the Congress may by law vest the appointment of such inferior officers as they think proper in the President alone, in the courts of law, or in the heads of departments.

The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions which shall expire at the end of their next session.

Sec. 3. He shall from time to time give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may on extraordinary occasions convene both Houses, or either of them, and in case of disagreement between them, with respect to the time of the adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed, and shall commission all the officers of the U. S.

Sec. 4. The President, Vice President, and all civil officers of the U. S. shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes and misdemeanors.

ARTICLE III., Sec. 1. The judicial power of the U. S. shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the Supreme and inferior courts, shall hold their offices during good behavior, and shall, at stated times, receive for their services a compensation, which shall not be diminished during their continuance in office.

Sec. 2. The judicial power shall extend to all cases, in law and equity, arising under this Constitution, the laws of the U. S., and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers, and consuls; to all cases of admiralty and maritime jurisdiction; to controversies to which the U. S. shall be a party; to controversies between two or more states; between a state and citizens of another state; between citizens of different states; between citizens of the same state claiming lands under grants of different states; and between a state, or the citizens thereof, and foreign states, citizens, or subjects.

In all cases affecting ambassadors, other public ministers, and consuls, and those in which a state shall be party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned the Supreme Court shall have appellate jurisdiction, both as to law and fact, with such exceptions and under such regulations as the Congress shall make.

The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the state where the said crimes shall have been committed; but when not committed within any state, the trial shall be at such place or places as the Congress may by law have directed.

Sec. 3. Treason against the U. S. shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort.

No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

The Congress shall have power to declare the punishment of treason; but no attainder of treason shall work corruption of blood or forfeiture except during the life of the person attainted.

ARTICLE IV., Sec. 1. Full faith and credit shall be given in each state to the public acts, records, and judicial proceedings of every other state. And the Congress may by general laws prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof.

Sec. 2. The citizens of each state shall be entitled to all privileges and immunities of citizens in the several states.

A person charged in any state with treason, felony, or other crime, who shall flee from justice, and be found in another state, shall, on demand of the executive authority of the state from which he fled, be delivered up, to be removed to the state having jurisdiction of the crime.

No person held to service or labor in one state, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

Sec. 3. New states may be admitted by the Congress into this Union; but no new state shall be formed or erected within the jurisdiction of any other state; nor any state be formed by the junction of two or more states, or parts of states, without the consent of the legislatures of the states concerned as well as of the Congress.

The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the U. S.; and nothing in this Constitution shall be so construed as to prejudice any claims of the U. S., or of any particular state.

Sec. 4. The U. S. shall guarantee to every state in this Union a republican form of government; and shall protect each of them against invasion, and, on application of the legislature, or of the Executive (when the legislature cannot be convened), against domestic violence.

ARTICLE V. The Congress, whenever two thirds of both Houses shall deem it necessary, shall propose amendments to this Constitution, or, on the application of the legislatures of two thirds of the several states, shall call a convention for proposing amendments, which, in either case, shall be valid to all intents and purposes as part of this Constitution, when ratified by the legislatures of three fourths of the several states, or by conventions in three fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided that no amendment which may be made prior to the year 1808 shall in any manner affect the first and fourth clauses in the ninth section of the first article; and that no state, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI. All debts contracted and engagements entered into before the adoption of this Constitution shall be as valid against the U. S. under this Constitution as under the confederation.

This Constitution, and the laws of the U. S. which shall be made in pursuance thereof, and all treaties made, or which shall be made, under the authority of the U. S., shall be the supreme law of the land; and the judges in every state shall be bound thereby, anything in the Constitution or laws of any state to the contrary notwithstanding.

The Senators and Representatives before mentioned, and the members of the several state legislatures, and all executive and judicial officers, both of the U. S. and of the several states, shall be bound by oath or affirmation to support this Constitution; but no religious test shall ever be required as a qualification to any office or public trust under the U. S.

ARTICLE VII. The ratification of the conventions of nine states shall be sufficient for the establishment of this Constitution between the states so ratifying the same.

AMENDMENTS.[1]

ARTICLE I. Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech or of the press; or the right of the people peaceably to assemble, and to petition the Government for redress of grievances.

ARTICLE II. A well-regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed.

ARTICLE III. No soldier shall, in time of peace, be quartered in any house without the consent of the owner, nor in time of war but in a manner to be prescribed by law.

ARTICLE IV. The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated; and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched and the persons or things to be seized.

ARTICLE V. No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service, in time of war and public danger; nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb, nor shall be compelled in any criminal case to be a witness against himself; nor to be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

ARTICLE VI. In all criminal prosecutions the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the state and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process

[1] Articles I to X, inclusive, were proposed by the First Congress in 1789–90. Article XI in 1793, Article XII in 1803, Article XIII in 1865, Article XIV in 1868, and Article XV in 1870.

for obtaining witnesses in his favor, and to have the assistance of counsel for his defense.

ARTICLE VII. In suits at common law, where the value in controversy shall exceed $20, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise reëxamined in any court of the U. S. than according to the rules of the common law.

ARTICLE VIII. Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishment inflicted.

ARTICLE IX. The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people.

ARTICLE X. The powers not delegated to the U. S. by the Constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people.

ARTICLE XI. The judicial power of the U. S. shall not be construed to extend to any suit in law or equity commenced or prosecuted against one of the U. S. by citizens of another state, or by citizens or subjects of any foreign state.

ARTICLE XII. The electors shall meet in their respective states and vote by ballot for President and Vice President, one of whom at least shall not be an inhabitant of the same state with themselves. They shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice President; and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice President, and of the number of votes for each, which lists they shall sign and certify, and transmit, sealed, to the seat of the government of the U. S., directed to the President of the Senate. The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted; the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers, not exceeding three, on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two thirds of the states, and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a president, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice President shall act as President, as in the case of the death or other constitutional disability of the President. The person having the greatest number of votes as Vice President shall be the Vice President, if such number be a majority of the whole number of electors appointed; and if no person have a majority, then from the two highest numbers on the list the Senate shall choose the Vice President; a quorum for the purpose shall consist of two thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice President of the U. S.

ARTICLE XIII, Section 1. Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the U. S., or any place subject to their jurisdiction.

Sec. 2. Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XIV, Section 1. All persons born or naturalized in the U. S., and subject to the jurisdiction thereof, are citizens of the U. S., and of the state wherein they reside. No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the U. S.; nor shall any state deprive any person of life, liberty, or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

Sec. 2. Representatives shall be apportioned among the several states according to their respective numbers, counting the whole number of persons in each state, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice President of the U. S., representatives in Congress, the executive and judicial officers of a state, or the members of the legislature thereof, is denied to any of the male inhabitants of such state being twenty-one years of age, and citizens of the U. S., or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such state.

Sec. 3. No person shall be a Senator or Representative in Congress, or elector of President and Vice President, or hold any office, civil or military, under the U. S., or under any state, who, having previously taken an oath as a member of Congress, or as an officer of the U. S., or as a member of any state legislature, or as an executive or judicial officer of any state, to support the Constitution of the U. S., shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two thirds of each House, remove such disability.

Sec. 4. The validity of the public debt of the U. S. authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the U. S. nor any state shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the U. S., or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

Sec. 5. The congress shall have power to enforce, by appropriate legislation, the provisions of this article.

ARTICLE XV, Sec. 1. The right of the citizens of the U. S. to vote shall not be denied or abridged by the U. S., or by any state, on account of race, color, or previous condition of servitude.

Sec. 2. The Congress shall have power to enforce this article by appropriate legislation.

See CONSTITUTION.

Constitu'tional Un'ion Par'ty, or Bell-Ev'erett Party, in U. S. history, political association formed by the old-line Whig and Southern Know-nothing parties who wished to avoid a conflict between N. and S. Delegates from twenty states met in Baltimore, May, 1860, and nominated John Bell, of Tennessee, for President, and Edward Everett, of Massachusetts, for Vice President. It had no platform, nor was any statement made as to slavery, but it passed a resolution "that it is both the part of patriotism and duty to recognize no political principles, but the Constitution of the country, the union of the states, and the enforcement of the laws." It carried the border states of Virginia, Kentucky, and Tennessee; cast a popular vote of 589,581, and had thirty-nine electoral votes, but disappeared after the campaign of 1860.

Constitu'tionists. See ACCEPTANTS.

Con'sul, an official title: (I) In ancient Rome the title of two supreme civil and military officers of the republic, elected annually, at first from the patricians only, but afterwards from the plebeians as well. The office was established after the expulsion of the kings, abt. 510 B.C. The consuls commanded the army, proposed laws, convoked and presided over the Senate, and were judges in suits at law. Abt. 365 B.C. their judicial functions passed to the prætors. The office became merely honorary in the Byzantine portion of the empire, and was suppressed, 886 A.D.

Soon after the entrance into office, the consuls cast lots for the provinces to fall to the share of each, the superintendence of which was conferred on them by the Senate. Later the custom was introduced of having several sets of consuls in one year; the year was named from those admitted on the first day, who were distinguished as *ordinarii* (regular) from those admitted later, these being termed *suffecti* (substituted). Persons also were sometimes dignified with the title without enjoying the office, and were distinguished as honorary consuls. Under Justinian the year ceased to be called by the name of the consul. See PRÆTOR; PROCONSUL.

(II) In French history consuls were the persons to whom, after the dissolution of the

Directory in 1799, was intrusted the provisional government of the country. According to the constitution thus framed, Bonaparte, Cambacérès, and Lebrun, called first, second, and third consul, were elected at the same time by the Senate, each for ten years, and invested with different degrees of authority. This government was gradually assimilated to a monarchy, and an easy transition was made from the consular to the imperial form; the title of emperor was substituted for that of consul, and the exercise of the sovereign authority was delegated exclusively to Napoleon Bonaparte.

(III) In modern times consuls are agents clothed with no diplomatic or poetical power, residing in a certain district of a foreign country to protect the commercial interests of the country which commissions them, and of its citizens or subjects. Their duties are determined by their own government, and they receive a permission to perform their duties from the foreign authorities. This is called an *exequatur*, and may be withdrawn for reasons judged sufficient. Consuls have no exterritoriality unless by special treaty, but are subject to the laws of the country where they reside. The U. S. ranks its consular servants as (1) consuls general who supervise all the consuls in a certain country or district; (2) consuls; and (3) commercial agents, who, though acting as consuls, are not officially recognized as such. See AMBASSADOR; EMBASSY; MINISTER.

Consump'tion, popular name for tuberculosis of the lungs, or *phthisis pulmonalis*. This disease, which carries off one in every seven human beings, was little understood until the nineteenth century. The manifestations of the disease had been well studied, but of the nature of changes in the lungs only the most erroneous ideas had been formed until 1794, when Baillie called attention to the little nodules in the lungs now called tubercles. Boyle (1810) still further described these nodules. The results achieved were, however, far short of an adequate meed of the labor, and, with the exception of Laennec, who was in these studies led to found the science of physical diagnosis, few of the observers added much to lasting knowledge until the introduction of Virchow's cellular pathology. This investigator finally described the minute structure of the small nodule or tubercle which forms the essential element in the morbid anatomy of the disease, and thereby laid the foundation on which rest all of our present conceptions. The most important contribution to the science of bacteria that has thus far been made was the demonstration by Robert Koch of the tubercle bacillus. See TUBERCULOSIS.

Consumption, one of the main divisions of political economy, the others being production, exchange, and distribution. It is the "withdrawal of goods from the market," either to satisfy present wants or to be turned into other goods. One of the fundamental questions of political economy is based upon the motives which create a demand for certain goods, and thus lead to production. This broad inquiry covers all the conditions of human life, touching on the one hand the call for articles of luxury and taste, and on the other analyzing the conditions which produce poverty and the elements which enter into the cost of the actual necessaries of life. Productive consumption is the consuming of goods for the purpose of producing other goods. Unproductive consumption, from the viewpoint of political economy, is the permanent withdrawal of goods from the market, as that of food which is eaten; though here the line between the waste of luxury and the necessary support of workers is hard to draw. Economists have, however, compiled figures showing the minimum of food required to produce the necessary force expended by an active laborer, indoor worker, etc. Men doing average moderate work require daily food which will develop about 3,500 calories, a calorie being the unit of heat which raises a gram of water 1° C. The following figures give the percentage distribution in different channels of consumption in 2,567 families investigated in the U. S.:

Food	42.54	Mortgages on home	1.58
Clothing	14.04	Tobacco	1.42
Rent	12.95	Labor and other organizations	1.17
Fuel	4.19	Books and papers	1.09
Furniture	3.42	Lighting	1.06
Insurance	2.73	Religious purposes	.99
Sickness and death	2.67	Taxes	.75
Liquor	1.62	Charity	.31
Amusements and vacation	1.60	Other purposes	5.87
			100%

Conta'gion, primarily the propagation of disease by contact, direct or indirect. It is scarcely distinguished in usage from infection which designates the communication of disease through the air. See EPIDEMIC; GERM THEORY OF DISEASE; INFECTIOUS DISEASES.

Contarini (kŏn-tä-rē'nē), name of a noble family of Venice that produced numerous doges, senators, generals, artists, and authors; among them: ANDREA, d. 1382; elected doge, 1367; gained an important victory over the Genoese, 1380, and saved Venice. DOMENICO, d. 1674; elected doge, 1659; waged war against the Turks, who took Candia, 1667, after a famous siege. GASPARO, 1483–1542, cardinal and writer; ambassador to the court of Charles V, and papal legate at the Diet of Ratisbon, 1541.

Contempt', in law, a disregard of the authority of a tribunal or a legislative body, for which the offender is liable to punishment by summary order, without the ordinary forms of criminal proceedings. The penalty for contempt is usually fine or imprisonment.

Conti (kŏn-tē'), name of the younger branch of the princely French family of Condé; derived from the small town of Conti, near Amiens; most distinguished members: (1) FRANÇOIS DE BOURBON, d. 1614; son of the first Prince de Condé; the first to assume the new title. (2) ARMAND DE BOURBON, 1629–66; younger brother of the great Condé; engaged in the war of the Fronde against the court; changed sides; married a niece of Cardinal Mazarin; commanded armies in Spain and Italy; wrote against stage plays. (3) LOUIS ARMAND DE BOURBON, 1661–85; eldest son of

the preceding; distinguished with Prince Eugene against the Turks; married daughter of Louis XIV. (4) FRANÇOIS LOUIS DE BOURBON, 1664–1709; brother of the preceding; distinguished in war; called the hero of the family; elected King of Poland by part of the nobility, 1697, but his rival, Augustus of Saxony, forestalled him. (5) LOUIS FRANÇOIS DE BOURBON, 1717–76; grandson of the preceding; displayed courage and skill as a soldier. (6) LOUIS FRANÇOIS JOSEPH DE BOURBON, 1734–1814; only son of the preceding and last prince of the family; gave allegiance to the revolutionary régime, 1790, but was under arrest in Marseilles, 1793–95; then expelled from France.

Con'tinent, natural division of land larger than an island. Modern usage recognizes four continents—Eurasia, Africa, N. America, and S. America—and is divided as regards Australia, which is variously styled a continent and a continental island. The title Antarctic Continent is sometimes given to a great body of land supposed to occupy the S. polar region. Formerly Europe and Asia were accounted as two continents. Eurasia includes the British, Baltic, and Mediterranean islands, and Ceylon; N. America includes Newfoundland, the Aleutian islands, and the Arctic islands W. of Greenland; and S. America includes Tierra del Fuego and the Falkland islands.

Continen'tal, epithet applied to the money and troops of the revolting American colonies during the Revolutionary War; introduced early in that contest by the colonists to distinguish their forces from those of the British Govt., which were called "'ministerial forces," being under the control of the British ministry. The "Continental Congress" was the congress of the colonies, and after the Declaration of Independence it was the Congress of the U. S. previous to 1788, when the Constitution came into force. It had only one House.

Continental Sys'tem, system established by Napoleon, 1806, to exclude from the Continent of Europe goods borne in British vessels or in neutral vessels that had touched at British ports. Great Britain retaliated, 1807, declaring all harbors and places of France, her colonies and allies, in a state of blockade. Decrees issued by Napoleon, 1807–8, declared any ship submitting to search by a British vessel, or sent on a voyage to Great Britain, or paying a duty to the British Govt. to be lawful prize of war, and, 1810, that all British goods when captured should be burned. At the Peace of Tilsit (1807) the Czar agreed to close the Russian ports. Thus almost the entire continental coast was blockaded, with consequent damage to trade. Russia's abandonment of the system (1810) was the chief cause of the war between her and France. The War of 1812 between Great Britain and the U. S. was due largely to the former's attempt to enforce her retaliatory "Orders in Council."

Con'tours, lines traced on the surface of the earth, at a uniform elevation above the mean ocean level. A contour map showing a number of these lines gives a better absolute idea of the surface of the ground than any other method of representation on a plane. These maps are made for earthwork estimates, railroad surveys, sewerage plans, as well as for general topographical representation. Contours are located in the field by a combination of the methods of leveling and surveying.

Con'traband, in commercial language, goods exported from or imported into a country against its laws. Contraband of war are such articles as a belligerent has, by the law of nations, the right of preventing a neutral from furnishing to his enemy. Articles contraband of war are, in general, arms and munitions of war, materials out of which munitions of war are made, coal for war ships, provisions and money for military forces, and all articles required for prosecution of war. To make them liable to capture, two facts must be proved: (1) their contraband character; (2) a hostile destination. As to certain articles being in themselves contraband there is as yet no general agreement. Ships made ready for war are contraband in the highest degree. Of course the same ship with a man-of-war's crew on board becomes not an article of commerce, but an armed expedition, and the state permitting the equipment would be responsible for its acts. The neutral state is not bound to prevent its subjects from trading in contraband articles. The burden of prevention lies on the shoulders of the belligerent who would suffer. The penalty for carrying contraband is confiscation of the goods first, but also of the ship if under the same ownership. Goods not contraband are not affected unless collusion or fraud is shown connecting them with the transaction. This penalty may attach at the outset of the voyage, if the ship's papers or the absence of them or other suspicious circumstance may warrant; and the doctrine of continuous voyages may be applied, so that a nominal neutral destination does not shelter goods.

Dispatches are commonly classed as contraband. By hostile dispatches is not meant the correspondence of a belligerent in the ordinary mails. Mail bags are sometimes specially exempted from search, as in a treaty between France and Great Britain to govern the Dover and Calais postal service; the same principle was adopted by the U. S. in the latter part of the Civil War. But where a neutral ship acts as a dispatch boat for one belligerent, carrying military orders, it may be, which might otherwise be prevented, or serving to unite the scattered portions of a fleet, it so identifies itself with that belligerent as to give the other the right to confiscate it.

Contrabands, fugitive negro slaves received and retained by the Union army during the Civil War, 1861–65. The name originated with Gen. Butler, who ordered some slaves escaped into the Union lines near Fort Monroe to be kept as "contrabands."

Con'tract, agreement in which a party undertakes to do or not to do a particular thing.

Contracts are distinguished according to their form, either as contracts of record, specialties, or simple contracts. Contracts of record are such obligations as are evidenced by judicial records, *e.g.*, recognizances and judgments. Specialties are contracts under seal, such as deeds, bonds, and covenants. Simple or parole contracts include those agreements which are not comprised within the first two classes, and may be either oral or in writing. As regards the mode of their creation, contracts are distinguished as express or implied. They are express when stated by the parties thereto consenting in direct and formal terms; implied, when they derive their origin and validity from construction of law (legal interpretation), as being of such a nature that reason and justice dictate their fulfillment. Contracts are also classified in reference to the time of their performance, as executed and executory. They are said to be executed when the obligations therein created have been already carried out; executory, when their fulfillment is yet to be accomplished.

Contracts of every variety include four essential constituent elements: First, competent parties; second, mutual consent to the terms of the agreement; third, a valid consideration, either actual or presumed; and, fourth, a definite and legal subject-matter to be acted upon. 1. All persons are presumed capable of entering into contracts except infants under the legal age (twenty-one years), persons of unsound mind, or those classes of persons, as married women, who have a special legal status. An infant's contracts for necessaries are binding, and his other contracts may be acknowledged by him after he is of age. 2. To make a contract there must be a meeting of the minds of the parties upon one and the same subject-matter. Persons who are forced into contracts by duress, *i.e.*, through imprisonment or fear of personal injury, or abuse of legal process, are excused from their fulfillment. 3. The consideration is the cause of the contract, the price paid for the promise, though a contract based on mutual promises is binding. In contracts evidenced by writings under seal and negotiable paper in circulation, the law presumes a consideration; in the case of the paper to protect innocent purchasers, and in writings under seal from the solemnity which the law attaches to contracts made in that form. A good consideration is natural love and affection which will support such a contract as the transfer of land from parent to child. A valuable consideration is anything which may be calculated as pecuniary loss or gain. Marriage is regarded as a valuable consideration. 4. The general principle in regard to the subject-matter of contracts is that parties may enter into agreements of any character they may choose. Certain important exceptions are, however, established on grounds of public policy. Thus the subject-matter must not contemplate any illegal undertaking or one against public policy. Thus contracts in restraint of trade or to prevent marriage are not favored. Such agreements are necessarily nugatory, and if attempted to be enforced their illegality may be alleged as a valid defense; but when the terms of the parties' stipulations are not thus contravened, it is the object of the courts to arrive at the exact meaning of the language employed as expressing the intentions of the persons contracting, and to enforce all unfulfilled obligations thence resulting. For this purpose certain definite rules of interpretation and construction have been established, which are principally applicable to agreements in writing. If the application of these rules shows a comprehensible agreement, and no defenses alleged prove its invalidity or that its terms have been satisfied either wholly or in part, an adequate remedy will be given for its violation. In courts of law this consists of pecuniary recompense or damages for the injury sustained, while courts of equity, in proper instances, will decree a specific performance of the engagements undertaken. Certain contracts must be in writing to prevent fraud and facilitate their proof. The law as to these is based chiefly on the statute of frauds.

Contral'to, in vocal music, the part immediately below the treble, formerly called also the counter tenor. It is often popularly called alto.

Contreras (kŏn-trā'räs), small village in Mexico, 10 m. SE. of the capital, at which a battle was fought between the Americans and Mexicans, August 20, 1847. See CHURUBUSCO.

Contribu'tions, in war, forced payments of money exacted from a conquered territory over and above the taxes used for its own govenment; they can be levied only by officers of the highest authority. The Germans in France in 1870 frequently made use of contributions, dooming particularly those towns or communes which had permitted attacks upon German soldiers, breaks in the transportation system, or other hostile acts, after occupation. Though a harsh measure, they are lawful in modern warfare.

Con'vent. See MONASTERY.

Conven'ticle, term early applied distinctively to meetings of Dissenters from the Established Church in England, first to the meetings of Wyclif's followers, and afterwards and more especially to those of the Scottish Covenanters. Severe laws for their suppression were passed, and hence the term came to be applied to almost any unlawful, secret religious assembly.

Conven'tion, in political language, an assembly of national representatives meeting on extraordinary occasions without being convoked by the legal authority. In French history the name is applied to that assembly which met after the Legislative Assembly had pronounced the suppression of the royal functions (September, 1792), and proclaimed the republic at its first sitting. The Scottish assembly which met on the flight of James II of England was entitled the Convention of Estates. In the U. S. meetings of representatives specially chosen by the people of separate states to revise and amend the state constitutions are termed state conventions. The term conven-

tion is also applied to the meetings of delegates of the several political parties for the nomination of candidates for office. Convention, in diplomacy, is term generally synonymous with treaty. Contracts between belligerents as to rules to be adopted on both sides in carrying on the war are technically termed general conventions. Treaties between the pope and Protestant powers have been often termed conventions. Convention in military language is a treaty between military commanders concerning terms for a temporary cessation of hostilities, generally between a victor and a defeated general for the evacuation of a district or position by the latter. The two most celebrated conventions of modern times were that of Closter-Seven (1757), between the Dukes of Cumberland and Richelieu, and that of Cintra (1808), between Junot and the English generals. See NOMINATING CONVENTION.

Convention Par'liament, in Great Britain, a parliament convened without the authority of the sovereign, when the crown is in abeyance. The acts of convention parliaments must afterwards be ratified by a parliament summoned in accordance with the provisions of the constitution. Two convention parliaments have occurred in English history: The first met in 1660, and restored Charles II to the throne, the Lords assembling by their own authority, and the Commons by virtue of writs issued in the name of the keepers of the liberties of England, by the authority of Parliament; the second met in 1689, each house by its own authority, and when James II fled from the kingdom, declared that his flight was equivalent to abdication, and offered the crown in joint sovereignty to William and Mary.

Conver'sion, in metallurgy, the process by which steel is produced from iron or from iron carbide (cast iron). Iron is converted into steel by long heating in contact with carbon. Cast iron is converted by "puddling," or by the process of Bessemer. The theory in both cases is the same—*viz.*, to oxidize the excess of carbon in the carbide.

Conversion, in law, term with two significations: 1. In equity it means the theoretical or presumed change of property from real into personal or personal into real. 2. In law it is applied to an unauthorized exercise of acts of ownership over the personal property of another.

Conver'ter, in metallurgy, the receptacle used to hold the iron or carbide of iron subjected to the process of conversion into steel. The Bessemer converter is a large, approximately spherical vessel, lined with fire clay or brick, the bottom of which is perforated with many holes, through which a blast of air is driven during the process. The vessel is suspended on pivots, and controlled by a hydraulic apparatus; by means of this, when the appearance of the escaping flame shows that the process is complete, the converter is turned over, and the liquid steel is received into molds.

Convey'ance, in law, a deed transferring property from one person to another. In the transfer of personal property the term, though strictly applicable, is not generally used.

Con'vict, person adjudged guilty of a crime by a verdict of a jury or by a judge alone. The method of treating convicts in any country or jurisdiction is termed its convict system. Some of the older systems, such as transportation and penal servitude, have been abandoned chiefly out of regard for their effect on the noncriminal class. Others have been discontinued as a result of a feeling against the infliction of cruelty on convicts, as well as out of regard for the community and the moral welfare of the convicts.

Convict La'bor. See PRISON.

Convoca'tion, meeting of the clergy of the Church of England to discuss church matters. There is one convocation for the province of Canterbury and one for the province of York. Each convocation has two houses—the upper consisting of bishops and the lower of deans, archdeacons, and proctors. Acts of convocation were formerly of great importance in the canon law, but since the time of Henry VIII they have no force when opposed to statute law. In 1861 Canterbury Convocation again exercised its legislative power; since 1852 it has met two or three times a year to transact church business. A new convocation is summoned on the opening of a new Parliament, *i.e.*, after a general parliamentary election. There is an Irish convocation with even smaller powers than those of the English Church. In the U. S. the word is usually applied to voluntary associations of the clergy of the Protestant Episcopal Church.

Convol'vulus, genus of dicotyledonous plants of the morning-glory family, including about 150 species, widely distributed in temperate and subtropical countries. Many are twining climbers, while some are erect herbs or even undershrubs. The leaves are alternate, undivided or lobed, the flowers funnel shaped, usually showy, and mostly solitary, the ovary two-celled and four-ovuled, and the two stigmas are linear, threadlike, or thickened. Many species are cultivated for their beautiful flowers. The purgative drug scammony is a resinous exudation from the root of *Convolvulus scammonia* of W. Asia.

Con'voy, one or more ships of war employed to protect a fleet of merchant vessels against an enemy by escorting them to their destination. The right of convoy is a limitation in favor of the neutral upon the war right of visitation and search, and rests solely upon treaty agreement. In theory the convoying ship is supposed to have accurate knowledge of the lading, destination, and character of each vessel in the convoy, and to be answerable that it violates no belligerent right, that it carries no contraband, that it is not bound for a blockaded port. An inquiry of the convoying ship by a belligerent cruiser is therefore substituted for the actual examination of the vessel suspected.

Convul'sion, an acute nervous affection, occurring in paroxysms, during which the patient

may lose consciousness; the muscles of the body are spasmodically contracted, and the limbs at first stiffened and twisted and then agitated by irregular involuntary movements. The face is distorted, the eyeballs rolled upward, the teeth clenched, frequently biting the tongue, which may protrude at the beginning of the attack. Respiration is arrested by contraction of the chest muscles and by closure of the glottis; the color of the face darkens; the veins of the neck swell, and froth issues from mouth and nostrils. After a shorter or longer time the muscles relax, respiration is restored, the agitation of the limbs having ceased; consciousness may be fully restored, or the patient falls into a heavy sleep, lasting, perhaps, several hours.

Convulsions may result from any cause which first irritates and then suddenly abolishes the functions of the brain and spinal cord; therefore occur in diseases of the nervous centers, in diseases of other organs of the body which transmit irritation to these centers; and finally in morbid conditions of the blood, influencing these centers, either by direct stimulation or by interfering with their nutrition. The treatment of convulsions may at times be addressed exclusively to the cause, where the danger of the paroxysm itself is known to be small. In the other cases, where life is liable to be endangered by the duration or rapid repetition of the convulsive attacks, relief is urgently demanded. The means are as follows: Compression of the carotid arteries; alcoholic stimulants; bloodletting; sedative remedies, such as bromides, chloral, chloroform, etc.; antihysteric medicines; warm baths or cold applications to the head. See SPASM.

Convul'sionists, party which arose among the Jansenists abt. 1730, and flourished till the middle of the century. Dean François, of Paris (d. 1727), had been one of the most conspicuous Jansenists, and by his charity and ascetic life had brought Jansenism in favor among the lower classes. People crowded in great numbers to the cemetery where he was buried, and when they reached his grave they were generally seized by convulsions, in which state they began to prophesy and to testify in favor of Jansenism. The government ordered the cemetery closed and the fanatics imprisoned (1733), but earth from the grave proved to have the same effect as the grave itself. The enthusiasm, with its convulsions and its alleged miraculous cures, continued for nearly twenty years.

Con'way, Thomas (Count), 1733–abt. 1800; British military officer; b. Ireland; educated in France, where he entered the army and attained the rank of colonel; in 1777 emigrated to the U. S.; offered his services to Congress; appointed brigadier general, and in December, 1777, made inspector general with rank of major general, in spite of Washington's protests; became so prominent in the plot to deprive Washington of the command of the army that the conspiracy was known as "the Conway Cabal"; in March, 1778, he offered, conditionally, his resignation, which Congress accepted without conditions; returned to France, and (1784) appointed Governor of Pondicherry and the French settlements in Hindustan; in 1792 returned to France to command the royalist forces in the South, but as the revolution went on he was forced to flee the country.

Conway's Cabal (kă-băl'), name applied to the conspirators in a plot (1777) to deprive Washington of the command of the army. This conspiracy, under the leadership of Thomas Conway, was strongly supported by those who blamed Washington for inactivity, in contrast to Gates's recent victory at Saratoga. A campaign in Canada was proposed, which Lafayette was to lead, with Conway to assist him. Washington learned of the plot and soon broke it up.

Co'ny, name employed in the English Bible for the animal called in Hebrew *shaphen,* and now believed to be the Syrian hyrax.

Conybeare (kŭn'ĭ-bār), **John,** 1692–1755; English prelate; b. Exeter; Bishop of Bristol, 1750; best remembered for his "Defense of Revealed Religion" in answer to Tindal's "Christianity Old as the Creation."

Cooch Behar'. See KUCH BEHAR.

Cook, James, 1728–79; English navigator; b. Marton, Yorkshire; entered the navy, 1755; master of a sloop at the capture of Quebec, 1759; commanded an expedition to the S. Pacific Ocean, 1768, to observe the transit of Venus; visited New Zealand and explored the coast of New South Wales; returned 1771; conducted another expedition to discover the *Terra Australis,* a continent supposed to exist in high S. latitudes, 1772; circumnavigated the globe, 1772–75; discovered the island of New Caledonia, and penetrated S. as far as 71° S. lat., but did not find *Terra Australis*; sailed on a third voyage to discover a NW. passage by way of Bering Strait, 1776; discovered the Sandwich Islands, 1778, and explored Bering Strait; returned to Hawaii, where he was killed by savages.

Cook, Joseph, 1838–1901; American lecturer on religious and social topics; b. Ticonderoga, N. Y.; was pastor of a Congregational church in Lynn, Mass., 1870–71; carried on the Monday lectures in Boston, 1874–80; in Europe and Asia, 1880–82, and resumed them in Boston, 1883; founded *Our Day,* a monthly periodical devoted to various reforms.

Cook or Her'vey Is'lands, a group of Pacific islands under British protection; between 18° and 22° S. lat., and 157° and 163° W. lon.; total area, 142 sq. m. There are six main islands; Raratonga is the largest, and has a pop. of 2,000; Mangaia has 1,540; Vatui or Atiu, 918; Aitutaki, 1,170; total pop. 6,230.

Cook'ery, the preparation of food for eating by the application of heat, often with the addition of condiments, dressings, etc. Cooking makes most food more digestible by softening it and developing its flavor; but the heat must be applied in the proper degree and in the

proper way, otherwise the digestibility may be decreased instead of increased. Heat, when applied to animal foods, coagulates the albumen, solidifies the fibrin, and gelatinizes the fibrous, tendinous, and connective tissues. Albumen in coagulating becomes first soft and creamy and then firm, while if the cooking be continued at a temperature above boiling it finally becomes leathery and indigestible. This is best seen with white of egg, but it is likewise true of the albumen in meat, although this is closely united with other elements. On the proper application of heat to albuminous substances depends the healthful and economical preparation of much of our daily food. The various ways in which meats are ordinarily cooked are as follows:

Boiling, the application of heat by immersion in water kept above the boiling point. For all except salt meats the water should be boiling when the meat is put in. After boiling rapidly for about fifteen minutes to form a thin, hard coating on the outside, to keep in the juices, the cooking is continued at a somewhat lower temperature until the meat is done. *Broiling*, the application of heat by exposure to powerful radiation, generally from red-hot coals. The heat received is not imparted by direct contact, as in case of boiling. The meat is held, by means of a wire broiler (now generally substituted for the older iron gridiron), at first close to the bed of coals, and after the formation of a browned (not scorched) coating, at a greater distance, until cooked to taste. Meat in slices (steaks, chops, etc.), birds, and fish may be thus cooked. *Roasting*, properly speaking, the application of radiant heat to larger masses of meat than those used in broiling, and at a somewhat greater distance from the fire. This requires the use of a spit, kept turning to expose the meat equally to the heat. The piece is kept moistened with butter or its own juices, which are caught, as they fall, in a dripping pan. Roasting as now generally done, however, is in reality baking, being done in an oven, so that the heat is applied partly by radiation and partly by contact of the heated air. The piece is kept from touching the pan in which it is cooked by means of a rack. *Stewing*, cooking in water for a long time at a low heat, so as to soften the meat completely; used with tough pieces. *Braising* is baking or "roasting" in an oven, when a small amount of water is added during the process. *Frying*, application of heat by direct contact, generally with a heated metal or stone surface (a "frying pan" or "griddle"), but sometimes by complete immersion in very hot liquid grease. In the first instance the pan is generally, but not necessarily, rubbed with fat to prevent sticking. All the above methods may be used also with vegetables; but these are usually stewed or fried. See FOOD.

Cook's In'let, part of the Pacific Ocean; in Alaska, opposite the island of Kodiak; between lat. 58° and 61° N., lon. 151° and 154° W.; 130 m. long.

Coo'ley, Thomas McIntyre, 1824–98; American jurist; b. Attica, N. Y.; removed to Michigan, 1843; became a lawyer, 1846; Prof. of Law, Michigan Univ., 1859; Justice of the Supreme Court of Michigan, 1864; Chief Justice, 1867–85; Chairman of the Interstate Commerce Commission, 1887–91; published many legal reports, digests, and compilations, including: "The Constitutional Limitations which rest upon the Legislative Power of the States of the American Union," Story's "Commentaries on the Constitution of the U. S., with Additional Commentaries on the New Amendments," "Law of Taxation," "Law of Torts," "General Principles of Constitutional Law in the U. S."; also wrote "Michigan," in the "American Commonwealth Series."

Coo'lie, in a general sense, an Asiatic laborer not belonging to the artisan class; in a special sense, a native of China or India emigrating to some foreign country under contract of labor. This coolie emigration began when slavery ceased, toward the middle of the nineteenth century. The first to avail themselves of the overstocked labor market of China were the British colony of Guiana, Peru, and Cuba. It was soon found that the whole traffic was a new form of slavery more degrading and atrocious than the old one. Great Britain took effective measures against the evil, 1855, but the result was simply that the whole traffic fell into the hands of the Portuguese, and degenerated still further. The convention of 1866 between France, Great Britain, and China first succeeded in confining the evil within certain limits.

Coomas'sie. See KUMASSI.

Coop'er, James Fenimore, 1789–1851; American novelist; b. Burlington, N. J.; son of Judge William Cooper, founder of Cooperstown, N. Y.; midshipman in the U. S. navy, 1808–11; published anonymously, 1820, "Precaution," a novel, considered a failure; in 1821 produced "The Spy, a Tale of the Neutral Ground," which had great success, was translated and republished in Europe. His next work was "The Pioneers" (1823), in which he gave a graphic description of American scenery and the adventures of life on the frontier; the same year he published "The Pilot," a tale of the sea, which was very popular. In "The Last of the Mohicans" (1826) he gave a vivid picture of the life and character of American Indians and trappers. In 1826 he visited Europe, where he remained nearly six years, publishing in that time "The Prairie," "The Red Rover," an admired tale of the sea, and other works. He criticised and satirized the defects and foibles of Americans in "The Monikins," "Homeward Bound," and "Home as Found." Among his other works are "The Pathfinder," "Wing and Wing," "Afloat and Ashore," "The Chain-bearer," "Oak Openings," and a "History of the Navy of the United States."

Cooper, Peter, 1791–1883; American manufacturer, inventor, and philanthropist; b. New York; son of a poor hat maker; learned the trade of coach making; laid the foundation of his fortune by inventing an improvement in machines for shearing cloth; successively a maker of cabinetwork, a grocer, and a maker

of glue and isinglass, which last business he carried on for more than fifty years. In 1830 he erected iron works at Canton, near Baltimore, and built the first locomotive engine constructed on the American continent; later erected a rolling and wire mill in New York, in which he first successfully applied anthracite to the puddling of iron; removed the machinery to Baltimore, 1845, and erected the largest rolling mill at that time in the U. S. for railway iron. He invested large capital in the extension of the electric telegraph; was the first president of the New York, Newfoundland and London Telegraph Company, the American Telegraph Company, and the North American Telegraph Company, and took part actively in the first expedition that laid the Atlantic cable, 1854. At an earlier date (1825), just before the Erie Canal was opened for traffic, he made the experiment of propelling a boat by means of an endless chain 2 m. long, supported on posts and rollers, which was driven by the force of elevated water, or might be driven by any other power, and propelled a boat 2 m. in eleven minutes. He served in the New York Common Council and was a school commissioner; founded and endowed an institution (the Cooper Union) for the free instruction of the industrial classes; nominated by the Independent Party for President of the U. S., 1876, he received nearly 100,000 votes.

Coop'erage, the art of making rounded vessels by binding together a number of wooden staves with hoops. It is of ancient origin and was diffused among many nations. Pliny asserts that it was invented by a people who lived at the foot of the Alps. Wet cooperage consists in making casks and barrels for liquids, such as wine, molasses, etc. For flour, fruit, etc., the cooperage is called dry, and of inferior construction. White cooperage is the name given to the making of tubs, churns, etc. The staves, cut mostly by machinery, are made broader in the middle, and must be curved precisely, so that when placed together and bound by the hoops they will meet accurately. The best casks and barrels are made of oak of superior quality and thoroughly seasoned. See BARREL.

Coöpera'tion, method of conducting industry in which the capital is supplied by and the control rests with the operatives when the industry is productive, and with the consumers when it is distributive. In the largest industries, like factories or railways, the managers represent the associated capital of a number of stockholders, and it is the ownership of the capital which gives the ultimate power of directing the industrial action. This state of things often produces conflicts between capitalists and laborers. To remedy these evils schemes of coöperation have been suggested, whereby industry should be managed by the producers (or the consumers) instead of by the capitalists.

The term coöperation is most loosely applied in current use. It is often extended to cover cases of profit sharing, where there is a distribution of profits from time to time among the employees of a business, or, more rarely, among its customers. Experiments in profit sharing are of great importance, but they do not involve the change of industrial system which is contemplated by the advocates of cooperation.

The guilds of the Middle Ages were to all intents and purposes coöperative enterprises; they were managed by associations of workingmen, each furnishing a small share of the capital required for the conduct of industry under mediæval methods. It was not until about the middle of the nineteenth century that we find organized attempts to establish associations of workmen carrying on business for their own account. A society of coöperative masons was founded in Paris in 1848 which worked its way to prosperity. Similar associations have been developed among other trades in France. In Great Britain and the U. S. they have been less successful. There is a record of a Boston tailors' associative union in 1849; but it was in the iron-foundry business, immediately after the Civil War, that the first successes in the U. S. were achieved.

Consumers' coöperation, or distributive cooperation, has had a longer continuous history. Under the influence of Saint-Simon and Fourier in France and Owen in England, attempts to do away with the capitalist were made by communistic societies. More than 300 such societies were started in the United Kingdom in 1820–30; but it was not until 1844 that a thoroughly successful coöperative store was established by the "Rochdale Pioneers." Twelve years after its beginning this society possessed a capital of £13,000, and conducted a general supply business of almost every kind, amounting at times to over £200,000 a year. Meantime there had been many such organizations in the U. S. Isolated experiments were made as early as 1830. In 1845 the Workmen's Protective Union of Boston organized a successful store. In the West, and afterwards in the South, the Patrons of Husbandry encouraged the local granges to form purchasing clubs. The Sovereigns of Industry, organized 1874, made coöperative distribution one of their principal objects; but their stores were unsuccessful, and the same thing may be said, with some reservations, of the Patrons of Husbandry also.

There are other forms of distributive cooperation quite as important as the stores. Chief among these are the societies for furnishing coöperative credit. The most important experiments of this kind in the U. S. have been the building and loan associations. Mutual insurance forms another important field of coöperative enterprise. In the U. S. it has been most successful among manufacturing industries. About the close of the Civil War a number of factories, which had to pay extremely high insurance rates on account of the frequency of fires in such establishments, undertook to insure one another instead of relying on an outside company, and this enterprise succeeded. We may also note certain forms of distributive coöperation among farmers, of which coöperative creameries have been perhaps the most successful. At first sight this seems like productive coöperation, but it

is really analogous to the work of the store or the mutual insurance company, since the industry is managed by those for whom the service is rendered. See PROFIT SHARING.

Coop'er Riv'er, in S. Carolina; rises in Charleston Co., and flowing SE. unites with Ashley River to form Charleston Harbor.

Cooper Un'ion for the Advance'ment of Sci'ence and Art, an institution founded in New York City in 1859 by Peter Cooper to afford the working people an opportunity to become proficient in trades and the technical sciences. Evening classes are held and there is a women's art school. The Union in 1900 received $600,000 from Andrew Carnegie, and in 1902 its income was about $100,000; its total endowments are $2,000,000. The hall of the Union building is often used by famous speakers. Over 2,500 students are enrolled in the day and evening classes, and the popular lectures and the reading room are largely attended.

Coör'dinates, in mathematics, a system of lines or algebraic quantities by which the position of a point or line is determined. The most common system is called the Cartesian, after Descartes, its inventor. Two lines of reference, O X and O Y, are taken, called axes of abscissas and of ordinates respectively. The position of P is then determined by the distances O M, called the abscissa, and M P, called the ordinate, which two distances are called the coördinates of the point P. The corresponding coördinates of a straight line are the negative reciprocals of the lengths, measured from O, which it cuts off from the respective axes of coördinates. In polar coördinates an initial axis is assumed (one extremity of which is called the pole), and an initial plane passing through the axis. Various other systems of coördinates are employed in analytical geometry.

Coos. See Cos.

Coos Bay, principal harbor of S. Oregon; has a good entrance, just NE. of Cape Arago, and its bar has 14 ft. of water at high tide. The Coos River flows into it. Four m. from the bar, on the S. shore, is Empire City, the capital of Coos Co.; and 4 m. from the mouth of the river is Marshfield, an important coal-mining center.

Coot, or Mud Hen, name applied in the U. S. to several ducks of the genus *Oidemia*; in Great Britain to a wading bird allied to the rails. The *Fulcia americana* is the coot of the U. S. The coot resembles the water hen, feeds upon mollusks and insects, and is an excellent swimmer. It walks quickly, and when it perches, grasps the branches firmly.

Copaiba (kō-pā'bă), or **Copai'va, Bal'sam of,** stimulant, diuretic, oleoresinous drug, of value in diseases of the mucous membrane; obtained chiefly from Pará in Brazil, though the trees which produce it grow extensively in tropical America. These trees are of many species or varieties, belonging to the genus *Copaifera* and the family *Leguminosæ* and subfamily *Cæsalpinia.*

Co'pal, name applied to several resins used in varnishes. The copal of commerce is usually a nearly colorless, translucent substance, imported from tropical America, India, and E. and W. Africa. The American copal comes from leguminous trees of the genus *Hymenæa* and allied genera. Zanzibar copal is the best.

Cope, sacerdotal cloak reaching from the neck to the ankles, and open in front; appears to have been modeled by Pope Stephen in 286, on the Roman *lacerna,* or hood; one of the vestments of the English Church, but now seldom worn.

Co'peck, or Ko'peck, Russian coin; the first ever used in that country as currency; originally made of silver, but copper copecks were afterwards coined. The copeck in use now is of bronze, worth little over half a cent. As the ruble, which equals 100 copecks, is the Russian standard unit, the value of the copeck varies with that of the ruble.

Copenha'gen, capital and only fortress of Denmark; on the E. coast of Seeland; consists of three divisions surrounded by fortifications —the old city, or W. End, the beautiful new city, or Fredericksborg, and Christianshaven on Amager Island. There are within the walls sixteen squares and market places, of which the most remarkable is the new King's Market, with an equestrian statue of Christian V. Among the most important buildings are the Church of Our Lady, with masterpieces by Thorwaldsen; Trinity Church, adjoining which is the Round Tower, about 125 ft. high, ascended by an interior spiral path of easy grade, up which Peter the Great once rode on horseback while his wife was drawn up in a four-horse carriage; the ruined royal palace of Christiansborg; the Amalienborg, four palaces surrounding a square in the midst of which is an equestrian statue of Frederick IV, occupied at present by the royal family and the Minister of Foreign Affairs; the Castle of Rosenborg, surrounded by a beautiful park and royal gardens; the Royal Theater, and the Thorwaldsen Museum, which contains only the works of that artist. The Museum of Northern Antiquities, founded 1807, contains a notable collection of articles of the stone, bronze, and ice periods. The Univ. of Copenhagen was founded 1479.

Copenhagen is the literary, artistic, and intellectual center of Denmark, as well as its industrial and political capital. There are manufactures of textiles, machinery, chemicals, porcelain; also sugar refineries and shipyards; but the main business is commerce. Regular lines ply to the ports of the Baltic and to Norway, while the Thingvalla line for the U. S. touches here.

Copenhagen was constituted a free port September 1, 1894. As early as 800 Copenhagen was a well-known trading point. Bishop Absalon built a fort here in the twelfth century for protection against pirates. In 1443 King Christopher, the Bavarian, chose Copenhagen for the royal capital. The city has undergone several sieges, the most important being those by Charles X of Sweden, 1658–60, when its

resistance saved the independence of the Danish monarchy; by the English, 1807, when a large part of the city was destroyed, and after its surrender the English carried away the fleet. In 1801 the great but indecisive battle between Nelson and Olfer Fischer was fought near Copenhagen. Pop. (1906) 514,134.

Coper'nican Sys'tem, that theory of the system of the world which represents the sun to be a fixed body, and the earth one of a system of bodies called planets which move around it. Hence it is known also as the heliocentric system. It derives its name from Copernicus, who attributes the idea of it to certain ancients, especially the disciples of Pythagoras. See ASTRONOMY.

Coper'nicus (Polish KOPERNIK), **Nikolaus**, 1473–1543; founder of modern astronomy; b. Thorn, Prussia, probably of German descent; lectured on astronomy at Rome, 1500; Prof. of Mathematics at Rome, 1501–3; Canon of Frauenburg, Prussia, 1503–43; also practiced medicine; expounded his discovery in his work "De Orbium Celestium Revolutionibus," finished, 1530, but, from fear of persecution, not published until 1543.

Cop'ley, John Singleton, 1737–1815; American painter; b. Boston; began to paint portraits abt. 1751; one exhibited in London, 1760, received praise from Benjamin West and other artists; settled in London, 1776; made a Royal Academician, 1779; continued to paint portraits and historical subjects, and achieved a wide reputation; painted the portraits of numerous celebrities of the Revolutionary period; most noted work, "Death of Lord Chatham," in the National Gallery.

Coppée (kŏ-pā'), **François Edouard Joachim**, 1842–1908; French poet and dramatist; b. Paris; author of many works, including "Le reliquaire," "Poèmes modernes," "Les mois," and the plays "Le passant," "Fais ce que dois," "Madame de Maintenon," "Les Jacobites"; elected to French Academy, 1884.

Cop'per, elementary metal known at a very early period. Before iron was used it was the principal ingredient in utensils and weapons. The Romans obtained the best copper from Cyprus, hence its Latin name, *cuprum*. Copper is distinguished by its peculiar reddish color. It is very ductile and malleable, and requires a temperature somewhat lower than gold, but higher than silver (above 2,000° F.), for its fusion. Water does not tarnish it, but when exposed to the air it becomes coated with green copper carbonate, which protects it from further corrosion. Next to silver, it is the best conductor of electricity, ranking in the pure state at 93.08, with silver at 100. The specific gravity of copper is between 8.91 and 8.95; atomic weight, 63.5; symbol Cu. It is very hard, elastic, and tough, with a tenacity only less than that of iron. It crystallized in the regular system, forming cubes, octahedrons, etc. Its principal ores are the sulphides of copper, either alone or combined with other metals, such as copper glance, indigo copper, copper pyrites, variegated copper ore; Fahl ores, containing admixtures of sulphides of copper, iron, zinc, silver, mercury, etc.; enargite, containing sulphides of copper and arsenic; oxidized copper ores, such as red copper and black oxide of copper; and copper salts, such as malachite (carbonate of copper), silicate of copper, dioptase, chloride of copper, atacamite, phosphate of copper, and arseniate of copper. The metal also occurs native (pure, or uncombined); is found also in small quantities in most soils, in seaweed, and in the animal body.

Copper forms two oxides, the protoxide and the suboxide; the former is found as dark steel-gray crystals, the latter occurs in red translucent crystals; prepared artificially, it forms a beautiful crimson powder. The carbonate of copper is sold as a pigment under the name of blue verditer, and from the subchloride of copper Brunswick green is obtained. The blue and green verdigris of commerce are made by the action of acetic acid upon oxide of copper. The blue vitriol so extensively used in dyeing and calico printing is sulphate of copper. The alloys of copper are of great value. Brass is copper alloyed with from twenty-eight to thirty-four per cent of zinc; gun metal, 90 parts of copper and 10 of tin; bell and speculum metals contain a large proportion of tin. Bronze is sometimes made of 91 parts of copper, 2 of tin, 6 of zinc, and 1 of lead. Copper with aluminum produces bronzes of great strength, ductility, and resistance to corrosion. German silver consists of copper, zinc, and nickel. Metallic copper is of great value in the arts, especially for ships' sheathing and bolts, and is also the material used in making a great variety of wares. The development of electric lighting and the transmission of power and of speech have led to an enormous increase in the consumption of copper, chiefly as wire. Copper is found in every quarter of the world. The U. S. is the greatest producer of copper in the world, more or less of the metal being found in nearly every state and territory of the Union. In 1845 the total production in this country was 100 long tons; 1905 it was 402,637 long tons, of which 102,807 were in the Lake Superior region, 140,514 in Montana, and 105,637 in Arizona. It was mined in the New England, middle, and S. states, in Utah, California, New Mexico, Colorado, Alaska, Wyoming, Nevada, Idaho, Washington, Oregon, and S. Dakota. The world's production, 1905, was 701,252 long tons, Mexico being the second largest producer, with 70,185 long tons. In 1907 the production in the U. S. was 343,300 long tons.

Copper Riv'er, Alaska; rises in the mountains S. of the Tanana and empties into the N. Pacific Ocean at about latitude 61°, longitude 145°; general direction S.; length, 500 m. An easy portage leads across the water parting between the Copper and Tanana. Two hundred m. above the large delta the river is joined from the E. by the Chittynia, which sends down copper in solution, from which the river derives its name.

Cop'peras, commercial name of the hydrated protosulphate of iron, "green vitriol"; com-

posed of 28.9 per cent of sulphuric acid, 25.7 of protoxide of iron, and 45.4 of water; is used in medicine, in the dyeing of black, and in making ink.

Cop'perhead, venomous serpent of the rattlesnake family with plates on the head but without rattles. When full grown it is about 3 ft. long, of a light copper color, with darker transverse bars. It has many local names. Is nowhere abundant, but is more common in the S. than in the N. states. Its bite is often fatal.

The name Copperhead was applied to any member of a party in the N. U. S. supposed to favor the secessionists during the Civil War. The epithet was given because this party was regarded as an insidious and secret foe to the Union.

Cop'permine Riv'er, a river of Canada; runs through the W. part of the Barren Grounds. Crossing the Arctic circle at about lon. 114° W, half its course is within the polar zone; empties into Arctic Ocean S. of Wollaston Land. It is about 360 m. long, and its valley is the N. continuation of that of the Yellow Knife, affluent of Great Slave Lake; derives its name from the native copper collected along its banks.

Co'pra, dried kernel of the cocoanut, one of the chief exports from the isles of the Pacific. It is used in India in making curries, and cocoanut oil is obtained from it.

Cop'rolite, fossil excrement of animals. The term has been extended in a commercial sense to include deposits of phosphatic rock containing large quantities of water-rolled fossil bones of fishes and saurians, such as occur at the base of Red Crag of Suffolk, England, and in S. Carolina and Florida. The value of these minerals is derived from the phosphate of lime of which they are partly composed. It is used with great advantage as mineral manure.

Cop'tic Church, direct continuation of the old Christian Church in Egypt, which dates from the earliest Christian centuries. Egyptians listened to the preaching of Peter on the day of Pentecost. Alexandrians disputed with the martyr Stephen. Eusebius says that Mark, the author of the second Gospel, was the first Bishop of Egypt. Since the bishopric of Dioscurus ceased, 452 A.D., monophysitism has been the tenet of the Copts. They have always detested the Council of Chalcedon (451). The Church retains the doctrine of transubstantiation, the practice of mariolatry and the confessional. In Upper Egypt the rite of circumcision has been retained, but in Lower Egypt it has been replaced by infant baptism. At the head of the Church is the patriarch, whose seat is now at Alexandria. Under him are three metropolitans and twelve bishops in Egypt, one metropolitan and two bishops in Abyssinia and one bishop for Khartum, besides priests whose duty it is to read the liturgy, but not to preach; preaching in Coptic churches is unknown. There are also deacons, subdeacons, an archdeacon, readers, and precentors. Ordination performed by the patriarch and bishops is complete only after the use of the sacred oil, which, through the continued miracle of St. Mark, is never exhausted. They lay no claim to apostolic succession through the laying on of hands. The Coptic Church has been peculiarly exposed to persecution. Their fasts are the "great fast" at Easter, fifty-two days, the fasts of Christmas, Whitsunday, and of the Ascension of Mary.

Copts, Christian people of Egypt, descended from the ancient inhabitants, whose blood, however, is mingled with that of Greeks, Arabs, Nubians, etc. They trace their lineage back to the pyramid builders, and now number about 608,000. Entire villages in Upper Egypt are occupied by Copts, and their faces are common in the Fayoum. The ruins of Coptic churches thickly dotting the Nile and Delta Valley prove that they were once more numerous than now. By apostacy and marriage with Moslems they have long been decreasing. In customs, manners, language, and spirit the Copt has become a Moslem from head to foot. Copts dress like Arabs, except that the turban is grayish black or light brown, and they often wear a black coat or gown over their other dress. The women veil their faces in public, and at home when male visitors are present. They are densely superstitious, and for centuries have been considered dishonest and deceitful. The Coptic language, which began to die out in the tenth and eleventh centuries, was written with thirty-one letters; twenty-five in the Greek uncial characters and six derived from hieroglyphic or demotic prototypes. With these elements it developed into an agglutinative tongue, expressing its grammatical elements by suffixes, prefixes, and combinations; variations of meaning were expressed by changes of vocalization. There were several dialects.

Cop'yhold, tenure of lands in Great Britain, founded upon immemorial custom; commonly said to have originated in a modification of the ancient villeinage by the commutation of base services into a fixed rent in money or money's worth, but this is not certain. A copyhold estate is a parcel of a manor, and is held according to the custom of that manor.

Cop'yright, exclusive right secured by law to the owner of an intellectual or artistic production to multiply and dispose of copies; constitutes literary property. The term is employed indifferently to signify the statutory and the common-law right of property in such productions. Statutory copyright is sometimes called copyright after publication, while common-law copyright is copyright before publication. There is a difference of opinion as to whether copyright existed among the ancients. There is no mention of any such property in the Pandects, and no case in Roman law of any action having been brought to protect a right in literary property. In general, anything may be copyrighted which is the subject of literary ownership. More specifically, "copyright," as used in the enactments of the U. S. Congress, applies to books, maps, charts, dramatic or musical compositions, engravings, cuts, prints, photographs, and their negatives, paintings, drawings, chromos, stat-

ues, statuary, and models or designs intended to be perfected as works of the fine arts. The words "engraving," "cut," or "print," as here used, are to be applied only to works connected with the fine arts or to pictorial illustrations. There is a peculiarity to be noticed in the case of a copyright of a dramatic composition. In this case it is not merely an exclusive right to multiply copies for sale, but also to perform or represent the play upon the public stage.

The property in a copyright is of an incorporeal nature. It cannot be seized by a sheriff in the exercise of his common-law powers and sold on an execution. Should the sheriff, for instance, sell in this way a copper-plate on which a copyrighted map was engraved, the purchaser would only acquire a title to the copper-plate considered as a corporeal thing, with no right to print maps from it. The term for which copyright is granted in the U. S. in the first instance is twenty-eight years. It is renewable for twenty-eight years more by the author, his heirs, executors, or next of kin. A copyright may be assigned by an instrument in writing.

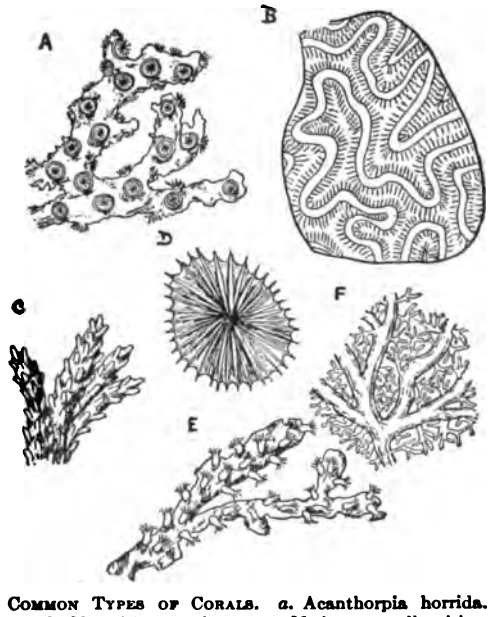
International copyright is an arrangement by which an author residing in one country may secure in such other countries as are parties to the arrangement the exclusive right of multiplying copies of his intellectual productions, and selling the same. In Great Britain international copyright was first granted by the acts 1 and 2 Vict., c. 59. Further legislation on the subject was had in the 7 and 8 Vict., c. 12, and again in 15 Vict., c. 12. By the latter act the queen, in council, might grant a copyright of five years for an authorized translation of foreign works, and also might prohibit for a like period, the representation of an unauthorized translation of a foreign dramatic piece. Prior to 1891 an author was not entitled to a copyright in the U. S. unless he was a citizen or a resident of the same; but in that year a law was enacted conferring on foreigners the privilege of copyright. The law, however, only applies to a citizen of a foreign state or nation when such foreign state or nation permits to citizens of the U. S. the benefit of copyright on substantially the same basis as its own citizens; or when such foreign state or nation permits to citizens of the U. S. copyright privileges similar to those provided for in U. S. law; or when such foreign state or nation is a party to an international agreement which provides for reciprocity in the grant of copyright, by the terms of which agreement the U. S. may at its pleasure become a party to such agreement.

Coquelin (kōk-lăń'), **Benoit Constant**, 1841–1909; French actor and author; b. Boulogne; made his début in the Théâtre Français, 1860, and kept on there till 1886; became a Sociétaire, 1863; played in England and the U. S. two seasons, in 1888 and 1893–94; was brilliantly successful as *Scapin*, *Don Juan*, *Figaro*, *Pierre Gringoire*, *Marcel* in "Les Ouvriers," *Leopold* in "Les Fourchambault," the *Duke* in "L'Étrangère," and as *Cyrano de Bergerac*, this last being probably his most distinguished rôle and one created by him (1897). Published "Art and the Comedian," "Comedians by a Comedian," etc.

Coquelin, Ernest Alexander Honoré, generally known as Coquelin Cadet, 1848–1909; French actor, brother of the preceding; b. Boulogne; made his début at the Odéon; passed to the Comédie Française, 1868; became a Sociétaire, 1879; achieved success in such rôles as *Ulrich* in "The Sphinx," *Isidore* in the "Will of Cæsar Girodot," and *Frederic* in "Friend Fritz"; under the pseudonym of "Pirouette" has published various light compositions.

Coquimbo (kō-kēm'bō), principal seaport of Coquimbo Province, Chile; harbor good and town well built. Coquimbo is now essentially united to La Serena, capital of the province just N. of it at the mouth of the Coquimbo River. Pop. (1895) 6,270.

Cor'al, hard skeleton secreted by certain marine animals resembling the sea anemones; is composed of carbonate of lime plus animal matter, and is a secretion of the external layer or skin of the body. A few species of coral polyps, like the mushroom coral, live separate, and in such the coral corresponds to the individual; but in most cases the coral-producing animals are colonial, and the coral is the product of the whole colony, the positions



Common Types of Corals. *a*. Acanthorpia horrida. *b*. Meandrina strigosa. *c*. Madrepora divaritica. *d*. Fungia papillosa. *e*. Red coral, corallium rubrum *f*. Stylaster sanguineus.

of its various members being seen in the pits on the surface of the coral. The valuable red coral has a treelike form, and sometimes reaches a foot in length. The most important coral fisheries are on the coasts of Algiers, Tunis, and Morocco, but coral is also obtained near Naples, Leghorn, Sardinia, and Corsica; Naples is the center of the coral trade. The

price varies according to color, large pieces of the finest rose pink being valued at from $400 to $500 per ounce, but small bits of the poorer colors, such as are used for children's necklaces, are worth $1 to $1.50 per ounce. The brain corals, star corals, etc., are massive. The *Madrepores, Oculinas,* etc., are branching, while *Agaricia,* etc., form incrusting masses. No true reef-building corals can live where the water falls below 60° F., but some forms occur even in the Arctic seas.

Coral lands and reefs are characteristic features of the tropical seas. Reefs occur as fringing reefs, barrier reefs, and atolls. Fringing reefs lie close along the shore of some island or land mass, not of coral formation. Barrier reefs are separated from the adjacent island or mainland by a lagoon of relatively shallow water, varying from a mile or two to many miles in width. Atolls are roughly oval reefs, inclosing a shallow lagoon, seldom over 200 or 300 ft. deep, and unbroken by any central island. Coral reefs are formed by the growth of various species of corals, or small polyps, living in communities. Each individual secretes carbonate of lime from solution in sea water, and thus form a stony skeleton, growing slowly to a considerable mass. The destructive action of the waves, as well as of various boring mollusks, breaks up this limestone framework; the finer particles are washed out into deep water, and the coarser sand is thrown back on the older part of the reef. The surface of coral reefs and atolls is built a few feet above the level of the sea by the heaping of coral sand from the beach by waves and winds. The breadth of the strip of land thus formed may reach half a mile or more. The reef is more or less interrupted by transverse channels, connecting the lagoon with the ocean, held open by tidal or wind currents, and frequently giving entrance to protected harbors. An atoll may consist of many small linear islands slightly disconnected. Reef-building corals thrive only in water whose lowest monthly temperature does not fall below 68° F., and they build at a depth not exceeding 120 ft.

The central and W. equatorial Pacific, together with the torrid Indian Ocean, are the regions of most numerous coral reefs and islands. They are relatively uncommon in the Atlantic; although the Bermudas, Bahamas, and Florida Keys are coral built; and many reefs occur around Cuba and other W. Indian islands. The most noted barrier reefs are those of the Society Islands and the great Australian reef, 1,200 m. long, lying off the NE. coast of Australia. The most important atolls are those in the Paumotu and the Caroline-Marshall archipelagoes. See ATOLL.

Coral Snakes, various serpents marked with conspicuous red bands which suggest polished red coral. Some in the U. S. are venomous.

Cor'anach. See CORONACH.

Cor'bel, in architecture, a projecting bracket, often sculptured; sometimes in the form of a basket; used to support an object, or to receive the springing of an arch. A corbel table is a projecting battlement, parapet, or cornice resting on a series of corbels.

Cor'bulo, Cnæus Domitius, d. 66 A.D.; Roman general who flourished under Claudius and Nero; he commanded the Roman army in a war against the Parthians, whom he defeated. Nero, who was jealous of him, ordered him to be put to death; when Corbulo heard this he fell on his sword.

Cord'age. See HEMP; ROPE.

Corday d'Armans (kôr-dā' dăr-măn), **Marie Anne Charlotte,** 1768–93; French patriot; b. St. Saturnin, Normandy; daughter of a poor nobleman; after the fall of the Girondists, May, 1793, became acquainted with some of those revolutionists who had fled to Caen, where she was residing; made her way to Paris and obtained an audience with Marat on the pretext of revealing Girondist plots; stabbed him; guillotined four days later; preserved her courage to the last, and stirred even the hearts of her executioners by her beauty and serene bearing.

Cordeliers (kôr-dĕl-yā'), political club in Paris, 1790, which received its name from the fact of its meeting in the chapel of the Franciscan Friars Cordeliers (Franciscan Friars Minor). The club was composed of extreme republicans and agitators, led by Danton, Marat, Hébert, and Camille Desmoulins, the latter of whom edited the famous revolutionary paper *Le vieux Cordelier*; was first allied with, but afterwards in violent opposition to, the Jacobins. It was overthrown, 1794, by Robespierre, and formally ended by the law of the 6th Fructidor (August 23, 1795), which closed all the political clubs of France.

Also the name of a branch of the Franciscans called "cord wearers" from their girdles of knotted cord. Soon after the death of St. Francis, 1226, a long controversy as to the rules of the order arose, which ended in the division of the order into two great branches, Conventuals and Observantines. Of the Observantines there are three branches: the Reformed, established, 1419; the Recollects, established, 1500; the Alcantarines, established, 1555. In France the Alcantarines were called Cordeliers on account of their girdle.

Cordil'lera, mountainous tract in W. N. America. This name, originally used in a somewhat similar sense by Humboldt, has been applied to the mountains of Central America and Mexico, and to all those of the U. S. and British America lying W. of the Great Plains, but has not passed into popular use.

Also the name of one of the great longitudinal or N. and S. mountain chains of the Andean system in S. America. Where there is only one chain the word Andes is commonly used; but where there are two or three parallel ones, one of them only is known, in common language, as the Andes, and the others are Cordilleras. In Colombia the three principal ranges are the W., central, and E. Cordilleras. Farther S. the Andes are the W. chain, separating Bolivia and the Argentine from Chile; the mountains farther E., some of them still higher, form the Cordillera Real, Cordillera

Oriental, and so on. The term Cordillera is also used loosely for the cross chains or knots in the Andean system.

Cord'ite, a smokeless British explosive named from the cord shape in which it is made. Its composition is nitroglycerin, fifty-eight per cent; gun cotton, thirty-seven per cent; vaseline, five per cent. It keeps well, and burns when ignited, but explodes when detonated. It is used in both cannon and small arms. See EXPLOSIVES.

Cór'doba, capital and principal city of the Argentine province of the same name; on the Rio Primero; 387 m. from Buenos Aires; founded, 1573, celebrated for its old cathedral, churches, monasteries, etc., and its university, the second in age in America (1613). The national observatory and meteorological station are located here. The Alameda, or public promenade, is one of the finest in S. America. Córdoba has an important trade in hides and wool. Pop. (1900) 50,000.

Cordoba or **Cor'dova,** city of Spain; capital of province of same name; on the Guadalquivir; 71 m. NE. of Seville. The river is here crossed by a stone bridge of sixteen arches built by the Moors in the eighth century, and defended by a Saracenic castle. The cathedral, originally a Mohammedan mosque, founded 786 A.D., presents in the interior a forest of columns of many orders and materials, brought from various ancient temples. Cordova contains a bishop's palace, three colleges, city hall, and numerous hospitals. It was formerly noted for the preparation of goat leather, called *cordovan.* Has manufactures of silk, paper, silverware, hats, etc. The ancient Corduba, sometimes called Patricia, built 152 B.C. by the Romans, was second only to Gades (Cadiz) among the cities of Hispania. This place was captured by the Moors, 672 A.D., after which it was for several centuries the capital of the W. caliphs. In the tenth century it contained nearly 1,000,000 inhabitants and 300 mosques. In 1236 it was taken and almost destroyed by Ferdinand III of Castile. Pop. (1900) 58,275.

Cor'dova, Francisco Hernandez de, abt. 1475–1526; Spanish explorer; went to the Isthmus of Panama with Pedrarias, 1514; served in various raids; sent to settle Nicaragua, which had just been explored by Gil Gonzalez Davila, but which Pedrarias claimed as a part of his territory, 1524; sailed from Panama, landed on the Pacific side of Nicaragua, founded Granada, Leon, and other towns, and explored the lake, discovering its outlet. On hearing of the arrival of Gil Gonzalez in Honduras, he sent Hernando de Soto against him; Soto was defeated and captured; Gil Gonzalez himself was captured by Olid, who had been sent there by Hernando Cortés. Olid rebelled and was killed, and finally Cortés himself went to Honduras to settle affairs. Cordova sent a message to Cortés (1525), offering to transfer his allegiance to him. Cortés encouraged him, but soon was obliged to return to Mexico, and Cordova then resolved to create an independent government in Nicaragua for himself. Pedrarias hurried to Nicaragua with a considerable force, seized Cordova at Leon, and had him beheaded.

Cordova, Francisco Hernandez de, d. 1517; Spanish explorer; accompanied Velasquez in the conquest of Cuba, 1511; received a grant of land and Indians near Santi Espiritu, and in 1517 had become one of the wealthiest men in the island. In that year he was induced to join in a voyage of exploration in the hope of obtaining gold and Indian slaves. Leaving Cuba with three vessels and 110 men, February 12, 1517, the party discovered the E. coast of Yucatan a few days latter, and followed it around to Campeche and beyond. They found signs of a civilization higher than any that had yet been seen among the natives of America. From near Campeche Cordova passed over to Florida, and thence to Cuba, where he died of wounds.

Cor'duroy (French "King's cord"), thick cotton fabric, strong and durable, with a cut pile like velvet, but of corded or ribbed surface, the division between the ribs being made by binding the pile weft to the cloth. A corduroy road in the U. S., a rough road over a swampy place made by laying logs side by side.

Core'a. See KOREA.

Corentyn (kō-rĕn-tĭn'), river of Guiana, forming the boundary between the English and Dutch colonies; rises near the Brazilian frontier, has a general N. course to the Atlantic, with a length along the main curves of about 400 m.; lower portion very tortuous, and generally lined with forests; it is navigable for about 150 m. for vessels drawing 7 ft.

Coreop'sis, a genus of herbaceous plants of the family *Compositæ,* named with reference to the form of the fruit. Plants of this genus have neutral ray florets and a double involucre. Many species, popularly called tickseed, are natives of the U. S. The *Coreopsis tinctoria* grows wild beyond the Mississippi, and is commonly cultivated for the beauty of its flowers, which are yellow with a brown-purple center.

Corfu (kōr-fō'), one of the Ionian islands; belonging since 1864 to Greece; separated from Albania by a channel; is 38 m. long; area, 227 sq. m.; surface hilly and picturesque, the highest points being about 3,000 ft. Olive oil is the chief export. It is the ancient Corcyra, whose people waged war against Corinth. A naval battle between these powers, 665 B.C., is mentioned by Thucydides as the first sea fight on record. Corcyra was in alliance with the Athenians in the Peloponnesian War. Capital of island is Corfu, a fortified seaport; on the E. coast; 10 m. SW. of Butrinto; has a safe and convenient harbor. Corfu stands near the site of the ancient Corcyra. Pop. (1896) 17,918.

Corin'na, celebrated Greek lyric poetess of Tanagra in Bœotia; flourished abt. 500 B.C. It is said that she overcame Pindar in a poetical contest, but the story is discredited.

Co'rinth, capital of Alcorn Co., Miss.; 93 m. E. by S. of Memphis; has large iron works and manufactures of textiles. During the Civil War several encounters took place here. The city was occupied by a Union force under Halleck in May, 1862, after its evacuation by the Confederates under Beauregard. On October 3–4, 1862, two battles occurred here between 20,000 Union troops under Rosecrans and 28,000 Confederates under Gens. Van Dorn, Price, and Lovell, resulting in the defeat and retreat of the latter with loss of 4,838; Union loss, 2,520. Pop. (1900) 3,661.

Corinth, an ancient city of Greece; on the Isthmus of Corinth and near the Gulf of Lepanto, 50 m. W. by S. from Athens; commanded all the passes between the Peloponnesus and N. Greece; by its position formed the most direct communication between the two principal Grecian seas—the Ionian and the Ægean, and became the emporium of the trade between the East and the West. Periander, one of the Seven Wise Men of Greece, was tyrant (prince) of Corinth abt. 625–581 B.C. Soon after his death Corinth became an ally of Sparta, and was ruled by an oligarchy. The Corinthians were defeated by the Athenian general Myronides, 457 B.C. As the ally of Sparta, Corinth fought against Athens throughout the long Peloponnesian War (431–404 B.C.). In 395 B.C. Corinth united with other Greek states in a war against the Spartans, who defeated the allies in several battles. This war, called the Corinthian War, was ended by the peace of Antalcidas, 387 B.C., and Corinth then returned to the alliance with Sparta. The battle of Chæronea (338 B.C.) rendered Philip of Macedon master of Corinth, which was subject to his successors, until it was annexed to the Achæan League, 243 B.C.

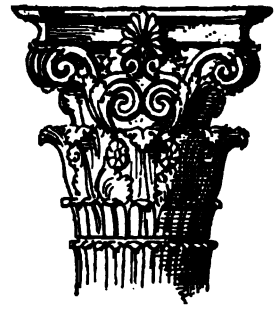
At this period Corinth was the richest and most luxurious city of Greece. The patron goddess of Corinth was Aphrodite (Venus), who had a splendid temple on the Acro Corinthus. The most elaborate order of ancient architecture derived its name from Corinth, which was one of the principal seats of Grecian art, but produced no eminent poets or orators.

Having been captured by the Roman consul Mummius, 146 B.C., Corinth was pillaged and nearly destroyed by fire. It was rebuilt by Julius Cæsar, 46 B.C., who planted here a colony of his veterans and freedmen. It soon rose again to be a populous and prosperous city. St. Paul preached here, and founded a Christian Church, to which two of his epistles were addressed. The principal monument of antiquity now remaining is the citadel, on a hill called Acro Corinthus, which rises 1,886 ft. above sea level, abrupt and isolated. The site of Corinth was occupied by the small town Gortho, destroyed by earthquake in 1858, and New Corinth was then built 5 m. from the ancient site, on the shore of the gulf, about 1½ m. W. of the entrance to the ship canal, which has given it much importance.

Corinth, Gulf of. See LEPANTO, GULF OF.

Corinth, Isth'mus of, neck of land connecting Attica with the Morea, and separating the Gulf of Corinth from that of Ægina; width, 4 to 8 m.; scene of the celebrated isthmian games and site of a famous Temple of Neptune. A ship canal has been constructed through the isthmus. It extends from the Bay of Corinth to the Gulf of Athens, is 3.9 m. long, and saves 185 m. from Adriatic ports and 95 m. from Mediterranean ports.

Corin'thian Or'der, form of column and entablature that originated in Greece. It was not generally used before the age of Alexander (330 B.C.), and the few remaining examples differ widely from each other. In Greek hands it was treated as a variant of the Ionic, having no distinctive form of base or entablature, but characterized mainly by its slender shaft and tall, bell-shaped capital encircled by rows of acanthus leaves. The Romans developed it into a distinctive order by giving it a special form of base and modifying the entablature, to the cornice of which they added modillions or brackets.



CORINTHIAN CAPITAL.

Among the principal antique examples of the order are the Pantheon, the temples of Mars Ultor, Vespasian, and Castor and Pollux at Rome; the Temple of Zeus at Athens, and the Maison Carrée at Nîmes, the last two being doubtless executed by Greek hands. The Corinthian order was frequently used by the architects of the Renaissance. The Capitol at Washington is a modern example of the order.

Corinthians, Epis'tles to the, canonical books of the New Testament. I Corinthians was written by St. Paul from Ephesus in the spring of 57 to rebuke the Church at Corinth for party spirit, disrespect to the apostle's authority, licentiousness, impropriety at public meetings (especially at the Holy Communion), vanity, and self-seeking. The apostle also settles some cases of conscience as to eating idol sacrifices, and a point of doctrine as to the resurrection.

II Corinthians.—The first Epistle had been sent by Titus probably, whose report greatly comforted the apostle (II Cor. vii, 4–16), so he sends him back a few months later with this second letter, which is a sober and conciliatory, yet earnest, statement of the apostle's true and just authority.

Corinto (kŏ-rēn'tō), port of Nicaragua; department of Chinandega; on a bay of the Pacific; connected by rail with Managua, Masaya, and Granada, and the Pacific mail steamers touch there regularly. The trade is important, the railroad having made this the principal port of the republic. Pop. abt. 3,000.

Coriola'nus, Caius Marcius, Roman hero, who, according to tradition, received the surname

"Coriolanus" because he defeated the Volsci at Corioli abt. 490 B.C. During a famine he advised that grain should not be distributed gratis among the plebeians unless they abandoned the right or privilege of electing tribunes of the people. For this offense he was banished. Having obtained command of the Volscian army, he marched against Rome, the citizens of which were unable to resist him. He was at length appeased by a deputation of Roman matrons, led by his mother Veturia, and his wife Volumnia. The story of Coriolanus forms the subject of one of Shakespeare's dramas.

Cork, third city of Ireland; capital of Cork Co.; on the Lee, 11 m. from the sea, and 136 m. SW. of Dublin; built partly on an island of the river, crossed here by nine modern bridges. Cork has a large, safe, and landlocked harbor, formed by an estuary of the river. The entrance, which is 1 m. wide, is 11 m. from the city. Queenstown is on an island in this harbor. Pop. (1901) 76,122.

Cork, the bark of the *Quercus suber*, a species of oak growing in Spain, Italy, and the S. of France. The bark may be removed annually without injuring the tree. Cork is extensively used in the form of stoppers for glass bottles, and in the construction of life preservers and life boats. When rasped cork is digested in water and alcohol, it leaves about seventy-five per cent of insoluble matter, called *suberine*. The cork tree has been introduced successfully in the S. U. S.

Cor'liss, George Henry, 1817–88; American inventor; b. Easton, N. Y.; inventor of the steam engine bearing his name, one of which moved all the machinery in the Centennial Exposition at Philadelphia; also invented an improved boiler with condensing apparatus for marine engines, and a pumping engine for waterworks.

Cor'morant, one of a family of aquatic birds (*Phalacrocoracidæ*) related to the pelicans. They are characterized by a long neck, compressed bill with a hook at the tip, wings of moderate length, and rather long, stiff tail; the toes, including the first, are connected by a web. Cormorants occur along the seacoast almost throughout the world, except in the coldest parts, and many are found on inland waters. They usually nest in large colonies. Cormorants live chiefly upon fish, which they capture by diving, and in China and Japan they are trained to fish for their owners. The double-crested cormorant, the common species of the U. S., is found on both coasts of N. America and in the interior. The European cormorant occurs sparingly on the E. coast of the U. S. A large, flightless cormorant was discovered on an island of the Galapagos group, 1898. It exceeds in size any known recent species, and is extremely rare.



CORMORANT.

Corn, general name given to various seeds, especially to cereal and farinaceous grains which grow in ears and are used for food, as wheat, barley, rye, and maize. In Great Britain the term is generally applied to wheat, rye, oats, and barley, and means simply "grain." In Scotland and Ireland, however, it is commonly restricted to "oats." In the U. S. the term is restricted to maize or Indian corn. See MAIZE.

Corn, a horny accumulation upon the surface of the human foot, produced by the pressure of the boot or shoe. Corns may be softened by hot water or poultices and the horny part removed with a knife. When painful they may be generally much relieved by the occasional application of a solution of nitrate of silver. There are various surgical appliances for their relief. Corns, when neglected, may give serious trouble.

Cor'narists. See CORNHERT, DIEDRIK.

Corna'ro, Caterina, 1454–1510; Queen of Cyprus; b. Venice; married James de Lusignan, King of Cyprus, and on his death, 1473, succeeded him on the throne; abdicated in favor of the Venetians, 1489.

Corn'crake, or Land Rail, a European bird, a rare visitant of the U. S.; is a wader, 7 in. long, of a brown-gray color, haunting corn and grass lands and osier beds; is a game bird, quite hard to flush, as it runs rapidly from a dog.

Cor'nea. See EYE AND VISION.

Corneille (kōr-nāy'), **Pierre,** 1606–84; French dramatic author, called the founder of the French drama; b. Rouen; practiced law several years; produced in 1629 "Mélite," a comedy, which was performed with applause; between 1629 and 1635 other comedies of inferior merit; in 1635, "Médée," a tragedy; 1636, "Le Cid," a tragedy in imitation of the Spanish drama of the same name; 1639, "Les Horaces" and "Cinna"; 1640, "Polyeucte," the last named and "Cinna" considered by some critics as his masterpieces; other works include "Le Menteur," a comedy, and "La Toison d'Or," an opera. In the opinion of many critics he excelled other French dramatists in impressive declamation, sublime thoughts, and a condensed and noble style.

Cor'nel, shrubby plant bearing the name of dogwood, belonging to the genus *Cornus*, which includes about twenty-five species, mostly of the N. hemisphere. The common dogwood of the E. U. S. is a small tree yielding a hard wood resembling boxwood. The dwarf cornel, or bunchberry, is a low herb growing in cold, damp woods in the North. There are, all told, eighteen species in N. America.

Cornel'ian. See CHALCEDONY.

Corne'lius Ne'pos. See NEPOS.

Cornell' Univer'sity, coeducational, nonsectarian institution at Ithaca, N. Y.; established by acts of legislature of 1865 and 1867, with a foundation of $500,000, given by Ezra Cornell. The entire income of the congressional land grant to New York (990,000 acres) was also secured, and subsequent sales of these lands added several millions to the endowment fund. The university was opened 1868; the first president, Andrew D. White, served till 1885. The university includes the College of Agriculture, Sibley College of Mechanical and Electrical Engineering, Sage College for Women, College of Civil Engineering, School of Law, Courses in Architecture, Arts, Philosophy, Science, and Letters. Since 1872 both sexes have been admitted. The grounds consist of 270 acres, picturesquely situated about 450 ft. above Cayuga Lake.

Cor'ner, a market where some special stock is dealt in. Usually applied to an attempt to buy the whole supply of some article, as wheat, or a particular stock, so as not only to control the price, but also to make a profit from those who have "sold short," *i.e.*, made speculative sales of goods which they did not possess, but believed that they could purchase later at a lower price. The corner is effective when the goods have to be bought from the pool or association that has maneuvered the corner and holds the goods or stock at a high figure. This is termed "squeezing the shorts." Corners are facilitated by the method of dealing on margins, by which a speculator or gang of speculators can control stock valued at many times their available capital. Among celebrated corners was the gold corner engineered by Jay Gould which caused the "Black Friday" panic of September 24, 1869, but was broken by the release of gold from the U. S. Treasury.

Cor'net, a musical instrument usually of brass, and originally of a curved, hornlike shape. Cornets are of various kinds, but the best form is that known as the *cornet-à-pistons* (a French term signifying a "cornet with pistons," because modifications of sound are produced by small pistons moved by the player's fingers).

Corn'hert, or Koorn'hert, Diedrik, 1522–90; Dutch author and reformer; b. Amsterdam; efficiently promoted the Reformation, but opposed Calvinism; write a "Treatise against the Capital Punishment of Heretics"; gave valuable assistance to the Prince of Orange in his contest against Spain, and became Secretary of State in Holland in 1572. His followers, who were called Cornarists, disappeared from history after the rise of the Arminian party in the Dutch Church.

Cor'nice, upper and projecting or crowning portion of a wall; is often made very ornamental by means of rich moldings, carving, inlay of colored materials, or by all these means; in Greek and Græco-Roman architecture, and in all styles derived from these, it forms the upper part of an entablature and consists of bed molding, corona, and cymatium or gutter, and sometimes other members, as dentils or modillions. See ENTABLATURE.

Cornif'erous Pe'riod. See DEVONIAN PERIOD.

Corn Laws, various enactments of the British Parliament for the regulation of the trade in grain. The first laws, in force soon after the Norman conquest, prohibited exportation in order to prevent scarcity in time of emergency. At the restoration of Charles II duties were imposed both on exportation and importation, while the old principle of a standard price, beyond which exportation was prohibited, was retained. In the reign of William and Mary a bounty was granted on the exportation of corn and the duties on exportation were abolished. These laws, some passed as early as 1360, were to protect the agricultural and landed interests, but the fluctuation in prices rendered the grain trade a gambling one. In 1846 Parliament provided for the gradual abolition of duties.

Corn'planter (Iroquois, GARIANWACHIA, "the planter"), abt. 1732–1836; half-breed Seneca Indian and chief of the Six Nations; son of John Abeel or O'Bail, a white trader; aided the French against the English, and was a deadly foe to the colonists during the Revolutionary War, but afterwards became their steady friend. He was a man of great intelligence, dignity, and moral worth; d. in Warren Co., Pa.; a monument was erected in his honor by the State of Pennsylvania, 1867.

Corn Snake, nonvenomous serpent of the S. U. S., of a brown color, and often 5 ft. long; is generally not seen except mornings and evenings; enters houses, devours young chickens and other small animals, but is of gentle and familiar disposition.

Cornuco'pia, in the fine arts, an ornament representing a horn, from which issue flowers, fruits, and leaves. The fable accounting for this emblem of plenty is that Amalthæa, when one of her goats had broken off a horn, presented it, wreathed with flowers and filled with fruit, to the infant Jupiter.

Cornu'tus, Lucius Annæus, Stoic philosopher of Leptis, Africa, who lived in Rome under Nero, and was the teacher and friend of Persius, whose satires he edited. He was banished by Nero together with Musonius Rufus. Of his works we have only a manual in Greek, known as "De Natura Deorum," compiled for studious youth from the etymologizing and allegorizing studies in mythology by the earlier Stoics.

Corn'wall, a county forming the SW. extremity of England; bounded by the ocean on all sides except the E. It constitutes a duchy, which is the appanage of the Prince of Wales. Area of the country, 1,350 sq. m.; the duchy includes a part of Devonshire. The surface is rugged, with fertile valleys. The river Tamar forms the E. boundary of Cornwall, which it separates from Devonshire. The extreme W. point of the county is a promontory called Land's End. Cornwall is rich in metals, especially tin and copper. The mining of kaolin and feldspar is also important. The fish-

eries are extensive. Chief towns are Falmouth, Penzance, Bodmin, and Truro. There are in Cornwall many dolmens and other prehistoric remains. The Cornish language ceased to be spoken about the end of the eighteenth century. Capitals, Bodmin and Launceston. Pop. (1901) 322,857.

Cornwall, Barry. See PROCTER, BRYAN W.

Cornwall'is, Charles (first Marquis and second Earl), 1738–1805; British general; b. London, England; became a favorite aid-de-camp of the king, but opposed the measures that provoked the war of 1775–81 with the American colonies; ordered to N. America, 1775, and with the rank of major general took part in the battles of Brandywine and Germantown, 1777. Having obtained the command of an army in S. Carolina, he defeated Gates at Camden, August 16, 1780; March 15, 1781, gained some advantage over Greene at Guilford Court House, and invaded Virginia; occupied Yorktown, which he intrenched, and remained on the defensive; Washington besieged Yorktown, and compelled Cornwallis to surrender his army of about 8,000 men, October 19, 1781. He is regarded as the ablest of the British generals who commanded in this war. In 1786 he was appointed Governor General of Bengal and commander in chief of the army in India; waged war against Tippoo Sahib, whom he defeated at Seringapatam, 1792; returned to England, 1793; in 1798 was Lord Lieutenant of Ireland, then the scene of a rebellion, and pacified the Irish by moderate measures; negotiated the Treaty of Amiens, 1802; Governor General of India, 1805; died at Ghazipur, India.

Corœ'bus, half mythical character of early Greek history; an Elean chiefly noted for his victory in the foot race at the Olympian games, 776 B.C. From the victory the Olympiads were reckoned. He slew the monster Pœne, whom Apollo sent to afflict the Argives. Another Corœbus was a Phrygian hero of the Trojan War, and a suitor of Cassandra.

Corol'la, in botany, the inner floral envelope of a plant; is usually more richly colored than the calyx; is composed of modified leaves (petals). Corollas are divisible into two classes, monopetalous and polypetalous, the latter of which have several distinct petals. The monopetalous corolla has only one petal, formed by the union of several modified leaves. The form of the corolla is much used in the classification of plants.

Cor'ollary, in mathematics, something in addition to the demonstration—*viz.*, an inference or consequence immediately deducible from the demonstration of a proposition.

Coroman'del Coast, greater portion of the E. coast of Madras, India; extending from Point Calymere to the mouth of the Kistnah; has no good harbor, and is heavily surf-beaten. The cities of Madras, Tranquebar, and Pondicherry are on this coast.

Coromandel Wood. See CALAMANDER WOOD.

Coro'na, botanical term applied to an appendage in the interior of the corolla of some flowers. In some cases the corona has the form of a cup, as in the narcissus. Formerly the corona was regarded as composed of modified stamens, or supernumerary petals; the tendency now is to regard it as composed of united petaline stipules. The five hooded bodies seated on the tube of the stamens of the asclepias are called the crown.

Also, a halo or crown of light of great beauty encircling the dark body of the moon during a solar eclipse. In a total eclipse the body of the sun is completely hidden by the interposition of the moon. Although so conspicuous on these rare occasions, the actual light of the corona is so faint as to be drowned out by the brightness of the earth's atmosphere on every other occasion. It consists very largely of lines, filaments, and rays, the former sometimes extending out to a distance of two or three degrees (several millions of miles). Probably it shines mostly by reflected sunlight, as its light has been found to be polarized. It also shines in part by its own incandescence. It is sometimes called a solar atmosphere, but comets have passed through the region of the corona with a velocity of several hundred miles a second, without suffering any retardation, which would have been impossible had they encountered an atmosphere. It appears to consist of minute isolated particles, thrown out by the sun, and either falling back again or held in suspension by forces of which we have little knowledge.

Corona Austra'lis, or **South'ern Crown,** constellation of the S. hemisphere; about the knee of Sagittarius; scarcely visible in the N. temperate zone.

Corona Borea'lis, or **North'ern Crown,** small but beautiful constellation between Hercules and Boötes; formed of a semicircle of stars which may be seen near the zenith from May till July.

Cor'onach, funeral dirge or lament, mingled with the shrieks and wailings of women; formerly heard in Scotland, especially in the Highlands. The funeral dirge, still used at wakes in Ireland, is commonly known as the *keen.* Traces of the same practice are found among many primitive peoples.

Coronado (kō-rō-nä'dō), **Francisco Vasquez de;** abt. 1500–42; explorer of New Mexico; b. Salamanca, Spain. He went to Mexico in 1535, and in 1539 was appointed Governor of Nueva Galicia, then embracing all of NW. Mexico, with an indefinite extension northward. At this time extravagant ideas were current about the "seven cities" of Cibola (the Indian pueblos of Arizona) reported by Cabeza de Vaca and seen by Niza. Coronado organized an expedition for their conquest. He left Culiacan in April, 1540, with 300 soldiers and 800 Indians, taking Niza as a guide. Crossing the deserts he reached the Cibola pueblos, but found none of the riches reported by Niza. He then turned E., exploring the region now called New Mexico, and possibly penetrating to Kansas; but he was everywhere disappointed in his

search for gold, and a large part of his force perished in the desert. He returned in March, 1542, and was employed in quelling the Culiacan revolt, but died not long after.

Corona'tion, the ceremony of placing the crown upon the head, commonly performed at the time of or soon after the accession of a new sovereign. In some countries of Europe it is customary for a bishop to place the crown on the head of the sovereign. In others, as in Prussia, the crown is sometimes placed upon the head by the monarch himself. The ceremony is a very ancient one, at least as old as Solomon's time. Anointing often forms a part of it, and in Great Britain the sovereign also takes an oath to support the laws, customs, and statutes of the realm, the laws of God, the Protestant Reformed religion, the Church of England, etc.; security for the Church of Scotland being promised in the oath of accession, which in some instances long precedes the coronation. The ceremony of coronation is not necessary to the authority of a monarch.

Cor'oner, anciently *Crowner,* formerly an officer of high dignity, who served as a deputy of the crown and as chief justice of the king's bench in England. At present, in England and most of the U. S., a coroner is an officer who in case of sudden or mysterious death summons a jury, which sits, in sight of the body, to determine the cause and manner of death. Coroners may commit persons suspected of homicide after inquest, without warrant, for trial, and are empowered, in the U. S., to take antemortem statements.

Coro'nium, chemical element; discovered, 1898, by Nasini, of Padua, Italy, who found in the spectrum of gases from the Solfatara di Pozzuoli a sufficiently bright line, attributed to coronium, an element not previously discovered, and which should be lighter than hydrogen. This line had only been observed in the solar corona. Coronium would seem to be a substance with a vapor density far smaller than that of hydrogen, which is the lightest body with which we are familiar. This discovery is another proof of the identity of materials in the sun and the earth.

Corot (kō-rō'), **Jean Baptiste Camille,** 1796–1875; landscape painter; b. Paris; exhibited in the Salon, 1827, and regularly every year until his death; lived chiefly at Ville d'Avray, where he painted many of his pictures; as a landscape painter he stands as the greatest and most poetical painter in the movement, begun by Delacroix and Géricault, that discarded classicalism and conventional forms, and turned to Nature itself for inspiration; a fine, though not a profuse, colorist; giving an indescribably beautiful and tender tone to his best work. He also painted a number of figure pieces, with nude figures in some of them; these works include "Dante and Vergil," in the Boston Museum of Fine Arts.

Cor'poral, in the Greek and Roman Catholic churches the altar cloth upon which the Eucharistic species and the vessels containing them are placed. A "corporal oath" is an oath sworn upon the corporal. The name is retained by the ritualistic party of the Anglican Church.

Corpora'tion, in law, an artificial person, consisting of one or more individuals, having certain legal capacities, such as succession of members, powers to sue or to be sued, and to act, no matter how numerous its membership may be, as a single individual. A contract made with a corporation is not made with the members, nor do they, in a legal point of view, own its property, though they may have an interest in its management on the theory of a trust. The term "eleemosynary" is substantially equivalent to "charitable," and embraces all that large class of corporate institutions whose services are organized for the general good, and rendered wholly or mainly at the cost of the institutions. Another division of corporations is public and private. A public corporation is designed for governmental purposes, as a city or a village. All others are private. A public corporation, being a mere instrument of government, can be created or dissolved by the law-making power at will, while a private corporation only comes into existence by the conjunction of the will of the sovereign power and that of the corporators. Its charter is in the nature of a contract, and it can only be dissolved by an observance of the rules governing the dissolution or impairment of the obligation of contracts.

A corporation, being by fiction of law a person, has the power to make contracts and to do most other acts possessed by natural persons. Also, like a natural person, it may transgress the rules prescribed by law for its action. This fact has caused many perplexing questions to arise as to the effect of an unauthorized act. This subject is known as the doctrine of *ultra vires*—transgression of power. The ordinary powers of a corporation are to make contracts that are necessary to its purposes, to hold and acquire property, both personal and real; to have a common seal, to make by-laws for the government of its members or of others, and to elect new members or officers in the place of such as may resign, die, or be removed. The act of removing a member is termed disfranchisement; the same act exercised toward an officer is called a motion.

A corporation may be dissolved either by compulsory legislation, by surrender of its franchises, coupled with acceptance of it by the state, and by judicial decree. As a charter of a private corporation is a contract, and as under the U. S. Constitution no state can pass a law impairing the obligation of contracts, the power of the state legislature cannot be exercised so as to change materially the provisions of the charter without the consent of the corporators. (See DARTMOUTH COLLEGE CASE.) The effect of this decision is evaded in a number of the states by the insertion of a clause, either in the charter or some general law, or even in the state constitution, providing that corporate charters are to be held subject to alteration or repeal.

A corporation organized in one state of the U. S. is allowed by the comity existing between the states to do business in another state, where, however, it is known as a foreign cor-

poration, and is usually required to put on the local records a copy of its charter and other evidence that it is properly organized. The states vary greatly in their laws as to the formation of corporations. Some require a proportion of the capital to be paid in before the corporation is organized; some levy a tax on the amount of the stock; others give special privileges, as the right to hold the stock of other corporations. The granting of this special power has made the State of New Jersey the popular home of the so-called trusts. The most common mode of dissolving a corporation is by judicial decree. If there be abuse or neglect to make use of corporate powers, a proceeding may be instituted in behalf of the state to vacate the charter. The abuse or neglect does not of itself destroy the charter, nor can the cause of forfeiture be presented to a court indirectly. A proceeding must be resorted to for the very purpose of forfeiting the charter. State laws sometimes provide dissolution as a mode of enforcing the collection of debts. The U. S. statutes of bankruptcy are extended to business corporations. See TRUST, COMMERCIAL.

Corps Legislatif (kōr lā-zhēs-lā-tēf'), name of the lower house of the French legislature during the Second Empire; established 1852, abolished 1870. The deputies were elected by universal suffrage for a term of six years.

Cor'pus Catholico'rum and **Corpus Evangelico'rum**, names given after the peace of Westphalia to the Catholic and Protestant divisions of the German Empire. The elector of Mayence was the head of the Catholics; while the lead of the Protestant confederacy belonged successively to the rulers (electors) of Saxony, the elector palatine, and King of Sweden, and was restored to Saxony by the diet of 1653. Both bodies were dissolved at the formal ending of the German Empire in 1806.

Corpus Chris'ti (Latin for "body of Christ"), festival of the Roman Catholic Church in honor of the Holy Eucharist (which is held by that Church to be really, truly, and substantially the body and blood of Christ); was first established by a bull of Urban IV, 1264, and is observed on the Thursday after Trinity Sunday.

Corpus'cular The'ory. See LIGHT.

Corpus Doctri'næ, certain collections of theological writings which have had especial authority in the German Protestant churches. The chief collection was "Corpus Philippicum" (1560), containing the Apostolic, Nicean, and Athanasian creeds, the Confession of Augsburg, Melanchthon's "Loci Communes," etc. The strict Lutherans rejected it as leaning toward Crypto-Calvinism; Elector of Saxony rigorously pursued those who refused to teach it. This, with many other Corpora Doctrinæ, was superseded by the "Formula Concordiæ."

Correggio (kōr-rĕd'jō), **Antonio Allegri**, 1494–1534; Italian painter; b. Correggio, 20 m. E. of Parma; most important works are at Parma, where the dome of the cathedral and that of the church of St. John the Evangelist were covered with his paintings—in the one case the ascension of the Madonna, in the other a vision of St. John; best known and most admired easel pictures: the "Marriage of Saint Catharine" and "Jupiter and Antiope," in the Louvre; the "Nativity of Christ" (called "The Night"), and the small picture of the "Magdalen," at Dresden; the "Leda," at Berlin; and the "Venus and Cupid with Mercury," in the National Gallery in London.

Corregidor (kōr-rāh-hĕ-dōr'), or **Mariveles** (mā-rē-vā'lĕs), island commanding the entrance to Manila Bay, P. I.; area, 2 sq. m.; surface elevated, rising to a height of 635 ft., where there is a lighthouse; has forts, an arsenal, and a semaphore station; only town, San José, on NE. shore. Pop. 600.

Corro'sive Sub'limate. See MERCURY.

Cor'rugated I'ron, iron in thin plates or sheets which are passed between rollers, producing grooves and ridges in the iron. In this manner the strength of the material is greatly increased, while its outer area is of course reduced. Corrugated iron is of value in the construction of buildings. It is frequently "galvanized"—*i.e.*, covered with a thin layer of zinc by dipping it in a bath of the fused metal. See IRON.

Corrupt' Prac'tices Act. See BALLOT.

Cor'sairs, piratical cruisers authorized by the Saracens and Turks to prey upon Christian commerce. Their principal strongholds were Algiers, Tunis, and Tripoli. The most notorious were Kham ed-Din, or Barbarossa, his brother Uruch, and Dragut. The term has been extended to include any freebooter or pirate, or ship used by such.

Corse, John Murray, 1835–93; American military officer; b. Pittsburg, Pa.; educated at West Point, but became a lawyer; entered the Union army, 1861; brigadier general, 1863; commanded a division in Sherman's Atlanta campaign, 1864; distinguished himself by defending 1,000,000 rations and other military stores at Allatoona against an overwhelming force; asked Sherman for assistance; received message, "Hold the fort, for I am coming"; replied, "Am short a cheek and ear, but can lick all hell yet"; defeated the Confederates with a loss greater than his own force; promoted major general for his achievement; after war was revenue collector in Chicago, and postmaster in Boston. Sherman's message inspired Philip P. Bliss's well-known hymn, popularized by Ira D. Sankey.

Cor'sica (ancient *Cyrnos*), island in the Mediterranean; 55 m. from Italy and 110 from France; separated from Sardinia by the Strait of Bonifacio, 9 m. wide; area, 3,377 sq. m. The W. coast is deeply indented by the gulfs of Calvi, Porto, Ajaccio, and Valinco. The interior is traversed by a mountain chain, the highest peak of which is Monte Cinto (8,889 ft.). There are large plantations of orange, fig, almond, olive, and lemon, and extensive vineyards; but the leading industry is the rearing of cattle, horses, asses, and mules. The fisheries of tunny and pilchard are extensive. Among the minerals are iron, copper, antimony, lead, granite, porphyry, marble, and

limestone. The chief towns are Ajaccio (the birthplace of Napoleon I), Bastia, and Calvi. Corsica was first colonized by the Phœnicians, who called it Cyrnos, was conquered by the Carthaginians, and by the Romans soon after 237 B.C. The Genoese became masters of it in 1481, and ceded it to France in 1768. Pop. (1901) 295,589.

Cor'so, in Italy, a principal street of a large town. The Corso of Rome is famous as the scene of the diversions of the carnival.

Cortés (kōr'tēz), **Hernando, Herman, or Fernando**, 1485–1547; Spanish soldier, conqueror of Mexico; b. Medellin, Estremadura; sailed to the New World to seek his fortune, 1504; served in the conquest of Cuba, 1511, and became the owner of an estate there; headed an expedition against Mexico, 1519; entered Mexico, or Tenochtitlan, without resistance; made the "Emperor" Montezuma prisoner, and extorted from him a large quantity of gold; threw off the authority of Velasquez, his superior officer, and defeated the troops of Narvaez, who was sent to supersede him; was driven from Mexico City by a revolt of the inhabitants, but retook it, 1521; appointed governor and captain general of the conquered country, called New Spain, 1522, but was given only the command of the army; returned dissatisfied to Spain, 1540. Served in the campaign against Algeria; was afterwards utterly neglected.

Cortes, the national assembly of Spain; also that of Portugal.

Cortona (kōr-tō'nă), **Pietro di**, 1596–1669; Italian painter; best known for his frescoes in the Barberina Palace, Rome, and the Pitti Palace, Florence, and his oil painting, "The Conversion of St. Paul."

Corundum (kōr-ŭn'dŭm), a mineral consisting, when pure, of native oxide of aluminium, but usually mixed with magnetic oxide of iron. Mineralogically there are three varieties: (1) Sapphire; (2) corundum proper, the duller kinds crystallized or semicrystalline, including adamantine spar; and (3) emery. In hardness, corundum is next to the diamond. Adamantine spar occurs in brownish crystal. It was used by the ancients as a polishing material, and continues to be used for fine work. The chief supplies are brought from China and the Ural Mountains. Corundum is found abundantly in Chester Co., Pa. See EMERY, RUBY, and SAPPHIRE.

Corun'na (ancient *Adrobicum*), fortified city and seaport of Spain; capital of province of same name; on the Atlantic Ocean; 320 m. NW. of Madrid. Has manufactures of linen and hats, cordage, canvas, and cigars. January 16, 1809, a battle occurred here between Marshal Soult and Gen. Sir John Moore, who was killed. Pop. (1900) 43,971.

Corvée (kōr-vā'), in feudal law, the obligation of the inhabitants of a district to perform certain services for the sovereign or feudal lord, such as the repair of the highways. Some of these services were performed gratis; others at less than usual wages.

Corvi'nus, Matthias, I, 1443–90; King of Hungary; son of John Huniades; b. Klausenburg; elected king, 1458; waged war against the Emperor Ferdinand III, the Turkish sultan, and the King of Poland; in 1485 captured Vienna; had superior military talents, and was an able ruler.

Cor'vus, Marcus Valerius, abt. 370–270 B.C.; famous Roman general; elected consul, 348 B.C.; defeated the Samnites, 343; chosen dictator, 342 and 301; consul for the sixth time, 299.

Cor'win, Thomas, 1794–1865; American statesman; b. Bourbon Co., Ky.; removed to Lebanon, Ohio, in youth; admitted to the bar, 1818; member of the state legislature, 1822–29; of Congress, 1831–40; governor, 1840; U. S. Senator, 1845–50; Secretary of the Treasury, 1850–53; member of Congress, 1859–61; Minister to Mexico, 1861–64; noted as an orator.

Coryban'tes, Phrygian priests of Cybele or Rhea; distinct from the Galli, who were Roman eunuchs and priests of the same goddess; celebrated the festivals of Cybele with dances and loud cries, beating on timbrels, and cutting their flesh with knives.

Cor'ymb, in botany, a form of inflorescence consisting of a central axis and lateral pedicels, of which the lower are longer than the upper, and the lengths of the pedicels are so graduated that the flowers are all on the same level, as in the *Spiræ*, *Kalmia*, and *Cratægus* (hawthorn).

Coryphæ'us, or **Coryphe'us**, leader of the chorus in ancient classical dramas, by whom the dialogue between the chorus and the other actors of the drama was carried on, and who led in the choric song. The name is metaphorically applied to any great leader; thus Dr. Johnson is sometimes called "the coryphæus of English literature."

Cos (kŏs), island of Asiatic Turkey; in the Mediterranean; separated from the coast of ancient Caria by a channel about 3 m. wide; was the Coos of the New Testament; was called Lango in the time of the Knights of Rhodes; area, 85 sq. m.; surface partly hilly, soil fertile, the climate delightful. Among the products are cotton, silk, wine, and fruits. In ancient times it contained a celebrated Temple of Æsculapius, to which was attached a school of physicians. Pop. abt. 15,000. Cos is also the name of a seaport town on this island.

Co'sa, Juan de, abt. 1460–1509; Spanish navigator; accompanied Columbus to Hispaniola and Cuba, 1493; explored the N. coast of S. America, 1501; made voyages thither, 1504–6, 1507–8; made a map of the New World, 1500, the earliest known; was slain by Indians.

Cosigüina (kō-sē-gwē'nă), volcano of Nicaragua; occupying a peninsula at the extreme NW. corner of the republic, between the Pa-

cific and the Gulf of Fonseca; is 3,835 ft. high; last eruption, 1835, when the explosions were heard as far as Oajaca, Mexico; the country for 100 m. around was darkened by the cloud, the obscurity in many places being like that of the thickest night.

Cosmog'ony, science which treats of the origin of the universe. If we except the cosmogony of the E. Indians, the earliest extant is that of Hesiod, which is delivered in hexameter verse. The first prose cosmogonies were those of the early Ionic philosophers, of whom Thales, Anaximenes, Anaximander, and Anaxagoras are the most celebrated. The different theories of the origin of the world may be comprehended under three classes: (1) Those which suppose the world to have existed from eternity under its actual form. Aristotle held this doctrine, and maintained that not only the heavens and the earth, but all animate and inanimate beings, are without beginning. (2) Those which consider the matter of the universe eternal, but not its form. This was the system of Epicurus and most of the ancient philosophers and poets, who imagined the world either to be produced by the fortuitous concourse of atoms existing from all eternity, or to have sprung out of a chaotic form which preceded its present state. (3) Those which ascribe both its matter and its form to the direct agency of a spiritual cause. The account given in Genesis of the creation is obviously not a scientific cosmogony.

Cos'sacks, certain Russian tribes first noted in the S. of European Russia, now generally scattered over the empire. They are small, courageous, superstitious, and have many communistic principles. They have been given many political privileges, the most important of which are freedom from taxes, and the rights of distilling, brewing, hunting, and fishing. They are now named by their present distribution as the Cossacks of the Don, of the Azof, of the Danube, of the Caucasus, Ural, Orenburg, Astrakhan, etc. Historically, they fall into two principal sections—the Cossacks of Little Russia, or of the Dnieper, and those of Great Russia, or of the Don. The Dnieper Cossacks apparently originated in bands of refugees, of mainly Russian blood, which formed on the islands of the Dnieper in the thirteenth and fourteenth centuries. Their government was democratic—the leader, or hetman, elective. Their services were lent to their powerful neighbors. Mazeppa was a hetman of this people. The Don Cossacks form a restless and warlike race, whose subjugation by Russia extended through centuries, and left them with many special privileges. Their territory now constitutes a province of European Russia, with an area of 33,532 sq. m., and a pop. (1905) of 2,585,920. They serve in the Russian army as light cavalry.

Costa Rica (kŏs'tä rē'kä), the southernmost country in Central America, with the Caribbean Sea on the NE., and the Pacific Ocean on the SW.; area, 18,400 sq. m.; pop. (1904) 331,340. It is bounded on the N. by the San Juan River and the S. shore of Lake Nicaragua; on the S. by the republic of Panama. The Caribbean coast line is 180 m. long, and the Pacific about twice as long. The Cordillera forms the backbone of the country; has as its highest point Pico Blanco (11,800 ft.). There are six volcanoes, only two of which (Irazú and Barba) have given signs of activity in late years. The climate is hot along the coasts and inland to an elevation of about 3,000 ft. The temperature is, however, lowered by the trade winds and sea breezes. A temperate region is found on the mountains from 3,000 to 7,500 ft. above the sea. The lower slopes are the populous portions, having a very salubrious climate, and being well watered and very fertile. The minerals include gold, silver, copper, and lead. The extensive forests yield mahogany, cedar, lignum-vitæ, and other valuable woods. India rubber, annotto, indigo, licorice, sugar, rice, cocoa, tobacco, maize, and cotton are produced. Coffee and bananas are leading articles of export. Cattle raising is an important industry. The state is a republic, with a president and one legislative chamber of thirty-two members, both elected for four years. It is divided politically into five provinces and two sparsely settled *comarcas*; the capital is San José. The people of Spanish descent dwell in or near the large towns, and there are many small settlements of English, French, Germans, and Italians. Education is compulsory and free. The Roman Catholic is the state religion, but there is entire religious liberty. Honduras was discovered by Columbus, 1502, and was called Costa Rica because some gold was obtained and rich mines were supposed to exist there. It remained in colonial times a province of Guatemala, was proclaimed independent 1821, and in 1824 became a state in the United Provinces of Central America. Since the dissolution of that confederacy (1848) it has practically remained an independent republic. The population is more homogeneous and progressive than in most other Central American states.

Cos'ter, or Kos'ter, Laurens Janszoon, abt. 1370–1440; Dutch mechanic; b. Haarlem; considered by his countrymen as the inventor of printing with movable letters, first of wood and afterwards of a combination of lead and tin. The legend runs that he printed the Dutch "Hailspiegel" with his wood type abt. 1423, and that after his death Johann Faustus, or Johann Gutenberg, one of his workmen, took possession of all his master's implements and founded a printing establishment at Mentz, bringing out the "Doctrinale" of Alexander Gellus abt. 1442. There are two statues of Coster in Haarlem.

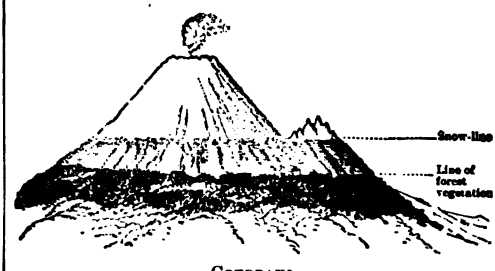
Cos'tume, dress and the ornaments of the person, in a general sense, and especially a national or provincial or local style of dress. The earliest sculptures found in Mesopotamia, dating from perhaps 3,000 B.C., show in common use a garment made of a large oblong piece of stuff carried over the left shoulder and under the right arm, the two edges overlapping along the left side of the body and left leg. The same garment appears in Egypt at about the same date; it is common in Assyrian

sculpture and in the monuments of the Persian Empire of the sixth century B.C. to the second, and we know it as the Grecian *peplos*. Its edges are often ornamented with fringes and with borders of rich embroidery. It appears often as the only garment of either sex; the Egyptian women are shown with this single garment drawn very closely around body and limbs, so that all the form is distinctly seen, while the Greek vase paintings of all epochs show it as much more loosely worn. During the classical age (500 B.C. to 300 A.D.) it is noticeable that the non-Greek peoples of W. Asia and Egypt are more inclined to cover and conceal the person than the Greeks. The chiton, or shirt, of the Greek women was made of one piece of stuff just as it left the loom, but with the opposite edges sewn together so as to make a straight case or tube of stuff open at both ends. This could be folded over at top, forming a kind of cape. The Roman costume was not very unlike that of the Greeks. But one peculiar garment they had, the toga, a large loose cloak worn by all citizens when out of their homes and in the city, but thrown off indoors, and little worn in the country. One marked distinction there was between the people of the Græco-Roman world and the nations whom they called barbarians, and who half surrounded them on the E., NE., and N.; these latter wore trousers, called *bracæ*. It may be assumed, however, that these garments originated in cold climates, and were only used by those who had often to visit cold regions. A kindred garment, the stocking, appears first in the early Middle Ages. Quicherat assumes that stockings, or socks, began to be used only when the classical traditions of personal cleanliness and constant bathing had been lost. The greatest extravagance in dress came with the last years of the sixteenth century. Those were the days of stuffing or bombasting. The trunk hose were so stuffed that it was with difficulty that a sword could be worn. Abt. 1580 starch was introduced and used to stiffen the neck ruff, which soon attained a breadth equal to the shoulders, and for some forty years was worn by both sexes. From A.D. 1600 to the French Revolution, whimsical extravagance of taste governed fashionable dress, a pretense at simplicity in the dress of one sex being accompanied by wild vagaries in that of the other. It is difficult for us to realize the fantastic unreason of the outfit of a *mousquetaire* of Louis XIII; or to conceive how the simple headdress with curls associated with Madame de Sevigné could be followed by the "tower" of lace on the head of a lady of 1690. The only parallel to these is in the lady's gown, which was 18 ft. in circumference at the floor, nearly as great at the hips, and intricately decorated with festoons and bouquets. With 1750 the male waistcoat and coat had been evolved from the doublet and cloak, the waistcoat having still the long flaps which were left from the skirts of the doublet. Knee breeches and long stockings were the nearly unchanged hose of the Middle Ages. Pantaloons followed knee breeches, and were worn for a very short time; they fitted the leg snugly, and were buttoned or tied at the ankle. Trousers followed these; the flaps of the waistcoat disappeared, and the costumes of the past were all merged into the uniformity of the last eight decades. What costumes still remain exist in places not dominated by the modern restraint of individuality. Women, indeed, retain the taste for novelty and for brilliancy of attire, but have lost the power of regulating it; costume has been lost in fashion.

Cosy'ra. See PANTELLARIA.

Cotil'lion, a dance, originally a variety of quadrille, now a dance usually performed at the close of a ball, in which a large number of the guests join. It consists of a number of figures, or parts of other dances, in which a leading couple are followed by other couples who keep changing partners. It usually begins with a grand march, and closes with every couple waltzing. Favors are bestowed at the end of each figure.

Cotopax'i, volcano of Ecuador; in the E. Cordillera of the Andes; 40 m. S. of the equator and about the same distance SSE. of Quito. It is the highest active volcano in the world, recent and very careful observations by Whymper giving 19,614 ft. above the sea, or 10,000 ft. above the valley of Quito; of this about 4,600 ft. is covered with snow. The form is almost perfectly conical. The eruption of 1534,



COTOPAXI.

ascribed to this mountain, was probably from Pichincha, but there have been many recorded outbreaks since 1742; some of them have sent out clouds of ashes which darkened the air for many miles around and fell on ships far out at sea; in others it is said that flames shot up several thousand feet. During the eruption of 1803 Humboldt heard the explosions at Guayaquil, 135 m. distant. In 1877 an outburst of cinders was followed by a deluge of water, mud, and stones, which in a single day reached the sea, over 200 m. distant. The top of Cotopaxi was first reached by Dr. W. Reiss in 1872; Whymper spent a night on the brink of the crater, which is 1,300 ft. deep.

Cot'tabus, game of skill often spoken of by Greek writers (Anacreon, Æschylus, Euripides, Antiphanes, Aristophanes) and depicted on Greek vases. It consisted in throwing a portion of wine left in the drinking cup in such a way that it passed through the air without its bulk being broken, and fell with a certain noise into another drinking cup. This feat required much dexterity, as the thrower had to retain the

recumbent position usual while eating and drinking. Excellence in the game was admired as much as excellence in throwing the javelin.

Cot'ton, John, 1585–1652; English Puritan minister; b. Derby; preached over twenty years at Boston, England, but, incurring Laud's displeasure, fled to Massachusetts, 1633; was pastor of the first church in Boston (organized 1630), and acquired such influence that he was called the Patriarch of New England. He opposed Anne Hutchinson and Roger Williams. He wrote nearly fifty books, all of which were published in London.

Cotton, Sir Robert Bruce, 1571–1631; English antiquary; b. Denton, Huntingdon; formed collections of books, manuscripts, coins, etc.; was knighted, 1603; created baronet, 1611. The Cottonian library was bestowed on the nation by his great-grandson, Sir John; first removed to Ashburnham House, Westminster, in 1730, and, after suffering from fire, 1731, was placed in the British Museum, 1753.

Cotton, a soft, downy fiber which surrounds the seeds in the capsules or bolls of plants of the genus *Gossypium* and order *Malvaceæ*. The species are many, and three are important: *Gossypium hirsutum*, called also short-staple upland, woolly seeded, and green seeded, which is the species, or some of its many hybrids, usually cultivated in the U. S. *Gossypium barbadense*, known also as sea-island, long-staple, or black-seeded cotton, the cultivation of which is confined principally to soils bathed in a salt atmosphere, and reaches its highest perfection along the coast of S. Carolina, Georgia, Florida, and in Egypt. *Gossypium arboreum*, or tree cotton, a perennial species that grows in S. America, India, and Africa, but is inferior to the annuals in yield and quality of fiber. Though of tropical origin, the cotton is most successfully cultivated in the temperate zone. The climatic conditions favorable to its best development are six months' exemption from frost, a well-distributed, moderate rainfall during the period of growth, with little rain and abundant sunshine while maturing.

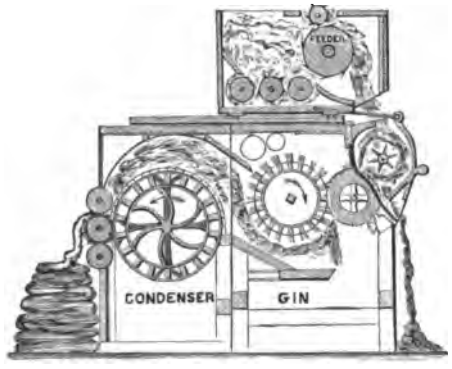
While the cotton plant is cultivated chiefly for the fiber, which grows upon the seed, the seed itself is valuable, and the fiber from the inner bark, resembling that of jute, also has commercial importance. The flower of *G. barbadense* is of a rich cream color; that of *G. hirsutum* white or light yellow, changing to red the second day. The flower is bisexual, and produces a capsule known as the "boll," which reaches maturity in six to seven weeks, when the surface, contracting, exposes the lint-covered seed ready for picking. This is done almost entirely by hand. Originally the cotton gin was an apparatus in which the cotton was passed between two rollers revolving in opposite directions. This, the "roller gin," is still used for ginning sea-island or black-seeded cotton, which is quite easily freed from its seeds. But green-seeded, upland, or short-staple cotton cannot be ginned by such [illegible] means. The lint of the woolly seeded varie[illegible] is separated from the seed by means of the saw gin, invented in 1793 by Eli Whitney, and which is essentially a cylinder composed of a series of steel disks, the edges of which are sharply serrated. These saws cut the lint from the seed while revolving with great velocity. The lint is taken from the saw teeth by another cylinder called the "brush," and conveyed to the "condenser." The lint is then packed into bales of about 500 lbs. each. The seed is then decorticated, the hulls constituting by weight one half of the seed; the meats, or



Shrub Cotton (*Gossypium barbadense*).

kernels, are then steamed, sacked, and the oil expressed, yielding 40 to 45 gallons of crude oil to the ton of seed. The cake is dried and ground, yielding about 800 lbs. of meal to the ton of seed. Injurious insects which attack the cotton plant are fungi, the larva of the cotton caterpillar, which may be destroyed by Paris green, and the boll worm, which is very destructive in some seasons, puncturing the young bolls or capsules. No satisfactory means of getting rid of the fungi, nor of the boll weevil, perhaps the worst of all cotton pests, has yet been found. The S. U. S., N. Mexico, British India, Egypt, Brazil, and Peru produce practically the cotton supply of the world. India ranks next to the U. S. in quantity produced, but not in quality of the lint. The soil and climatic conditions of the S. U. S. are superior to those in any other part of the globe, and the plant has received more intelligent cultivation there than elsewhere. The yield in these states ranges from one fourth of a bale of 500 lbs. to two bales to the acre. To produce two bales would require a yield of 3,000 lbs. of seed cotton, one third of which would be lint and two thirds seed. If the lint only is removed from the land, cotton is the least exhausting of the crops cultivated in the U. S. An average crop removes in the lint only 2.75 lbs. of nitrogen, phosphoric acid, potash, lime, and magnesia to the acre, while a crop of ten bushels of wheat to the acre removes 32.36 lbs. of the same elements of plant food.

Cotton Gin, a machine for freeing cotton from its seeds, which adhere to the fiber with



COTTON GIN (LONGITUDINAL SECTION).

great tenacity. See COTTON; COTTON MANUFACTURES.

Cotton Manufac'tures, textile fabrics composed of cotton and the processes by which they are produced. The fiber of the cotton plant is well adapted for the production of yarn or thread, and thus for employment in the fabrication of woven cloth. Each fiber if left to itself acquires a twist which adds to its tensile strength; and it is by twisting many fibers of cotton around one another that the strength necessary for a textile fabric is obtained. The spinning of cotton yarn and the making of coarse cotton cloth have been practiced from remote antiquity; but the application of machinery to the preparation, the spinning, and the weaving of cotton dates back little more than a century. The development began with the last process in the making of cloth, and the cycle of fundamental improvements was completed by the invention of a device for removing the seed from the raw material.

The fly shuttle was invented abt. 1750. About ten years later James Hargreaves, a Lancashire weaver, made an invention for carding cotton. In 1767 Hargreaves invented the spinning jenny, by which he was able to produce eight threads at once. Richard Arkwright patented in 1769 a spinning frame, or "throstle," called at first a "water frame," the chief and most useful novelty in which was a device for spinning with rollers. Samuel Crompton in 1779 combined the ideas of Hargreaves and Arkwright in the mule jenny. In 1785 Dr. Edward Cartwright, a clergyman, invented the power loom. Two things remained to render possible the gigantic expansion of the cotton industry which the nineteenth century witnessed—a quick and inexpensive method of separating the fiber from the seed, and a new mechanical force to drive machinery at a high speed. The cotton gin of Eli Whitney supplied the first, and the steam engine the second; but the first steam engine set up in a cotton mill (1785) antedated by seven years the invention which made possible the production on a large scale of cotton in condition for manufacture.

Early improvements in the mule were much greater than those in the spinning frame. The superiority of the modern automatic mule over the flyer frame for spinning fine yarns was so great that it almost superseded frame spinning, particularly in England. The invention of the "ring frame," in which the work formerly done by the "flyer" is performed by passing the yarn through a bit of curved wire, known as a "traveler," which moves around the spindle on a ring, has revolutionized spinning in the U. S. Meanwhile the spindle itself has been greatly improved. Inasmuch as the production of yarn is substantially in proportion to the speed of the spindle, it follows that the new spindles are much more economical as well as more efficient. For the modern spindles make 10,000 turns a minute—as against a maximum of 7,500 turns so lately as 1870—and they run so much more easily that the same power moves twenty-five per cent more of them at the higher speed than of the old ring spindles at the lower speed.

In 1908 there were 27,505,000 spindles in operation in the U. S. The banner cotton-manufacturing state was Massachusetts. Then followed S. Carolina, N. Carolina, Rhode Island, Georgia, New Hampshire, and Connecticut. The total consumption of cotton in all mills was 4,539,000 bales. In the year 1908 there were exported 3,816,998,693 lbs. of domestic cotton, valued at $437,788,202.

Cotton Worm, the caterpillar of an owlet moth, in some years very destructive to the cotton crop of the U. S. and of Central and S. America. It is 1½ in. long, green, with light-yellow stripes and black dots along the back; has sixteen legs, and is a semilooper. It hatches in from one to two weeks from eggs deposited on the under side of the leaf of the cotton plant. The moth is of buff color, and about 1 in. long.

Cot'ton-Seed Oil, oil obtained from the cotton plant, and allied species. The bolls of the plant contain cotton fiber and seed in the proportion of one part by weight of fiber to two and one half or three of seed. The average percentage of oil is fifteen to twenty, while twenty-five per cent is regarded as high. Although the cotton plant has been cultivated for over a thousand years, no use has been made of its products, except the cotton fiber, until recently. Now the fiber of the plant stalk is made into a coarse bagging, the root is used in dyeing and pharmacy, and the seeds yield as a principal product the oil, besides several valuable by-products. Cotton-seed oil is used as an adulterant or as a substitute for various oils, such as linseed, sperm, lard, olive, almond, etc. It is extensively used in cooking as a substitute for butter or lard in the U. S., and is growing in favor. It also finds application in treating leather, in dressing wool, and as a lubricator and an illuminant, as well as in soap making. It has been stated that nine tenths of all of the "salad oil" consumed in the U. S. consists of cotton-seed oil. Next to the oil, the cake is the most important product. Frequent examinations have been made of the cake, with a view to its utiliza-

tion. Phosphoric acid constitutes about one third of the mineral matter present. In Marseilles the cake is extracted with carbon bisulphide, the oil thus obtained affording a valuable greenish soap. Much of the cotton-seed cake produced is used as fodder for cattle, and much of it as a fertilizer. Experiments with the ground cake ("cotton-seed meal") as a packing for the axle boxes of railway cars, etc., have proved it to be an efficient and economical substitute for cotton waste saturated with oil.

Cotton States and Interna'tional Exposi'tion. See EXPOSITIONS.

Cougar (kō'gär). See PUMA.

Cough, a sudden inspiration, followed by closure of the glottis, and a sudden expiration, causing a strong current of air to sweep through the air passages and out of the mouth. Cough may be due to irritation of foreign particles or gases, or of diseased secretions in the larynx, trachea, or bronchi, and tends to remove these. The act is more or less reflex and involuntary. Disease of the bronchial tubes—bronchitis—is the most frequent cause. Certain diseases quite distant from the lungs, however, may cause this symptom, especially in children, as inflammations in the nose, with swelling of its mucous membrane, enlargements of the tonsils and irritation elsewhere in the pharynx, and occasionally abdominal diseases. A persistent cough is always regarded with dread, and for a long time may be the only symptom of consumption, especially in one of pronounced phthisical habit or hereditary tendency. The treatment of cough varies with the cause. It is by no means necessary in every case to attempt to reduce its severity, since in many the act is conservative in tending to remove an irritant. When, however, the secretions are dry and tenacious, the cough is apt to become excessive without accomplishing any result in the way of removal of the irritant. In such cases mucilaginous drinks and sedatives, especially opium, do much good by reducing the cough.

Coulomb (kō-lōn), **Charles Auguste de,** 1736–1806; French scientist; b. Angoulême; member of the Academy of Sciences and the French Institute; published important treatises on mechanics, electricity, and magnetism; discovered the nonpenetration of electricity into the interior of solid bodies; and invented the torsion balance.

Coulomb, in electricity, the practical unit of quantity; the quantity of electricity transferred per second by one ampère; is $\frac{1}{10}$ of the absolute (C.G.S.) unit of quantity; named after Charles Auguste de Coulomb.

Coun'cil Bluffs, capital of Pottawattamie Co., Iowa; on the Missouri River; opposite Omaha, Neb., with which it is connected by two bridges, each over 2,700 ft. long; at the foot of high bluffs where Indian tribes formerly held councils; is the E. terminus of the Union Pacific Railway system, and a farming center with an annual trade of more than $35,000,000. An important council was held on the bluffs between the Indians and Lewis and Clark, the explorers; Mormons made a settlement here, 1846; which became a city, 1853. Pop. (1906) 25,117.

Councils, Ecumenical (ĕk-ū-mĕn'ĭ-kăl), certain great ecclesiastical assemblies, so called in distinction from diocesan, provincial, and national councils, which are more limited meetings of the same kind. The Greek and Latin churches acknowledge seven councils—*viz.*: (1) the first Council of Nice, 325 A.D.; (2) the first of Constantinople, 381; (3) the first of Ephesus, 431; (4) that of Chalcedon, 451; (5) the second of Constantinople, 553; (6) the third of Constantinople, 681; (7) the second of Nice, 787. To these the Roman Catholics add the following: (8) the fourth of Constantinople, 869 A.D.; (9) the first of Lateran, 1123; (10) the second of Lateran, 1139; (11) the third of Lateran, 1179; (12) the fourth of Lateran, 1215; (13) the first of Lyons, 1245; (14) the second of Lyons, 1274; (15) that of Vienne, in France, 1311; (16) that of Constance, 1414–18 (in part); (17) that of Basel, 1431–38; (18) the fifth Lateran, 1512–17; (19) that of Trent, 1545–63; and (20) that of the Vatican, 1869–70. The most important of these are noticed under their alphabetical heads.

Council of Sevil'le, or Ca'sa de Contratación', board originally established in 1503 at Seville to dispatch fleets to the Spanish colonies, receive vessels from the colonies, attend to the customs taxes and the royal treasure, and dispose of the results of trade or exploration. Bishop Fonseca was at first at the head of it, and like the Council of the Indies it had its germs in the board of 1493, appointed to assist Columbus.

Council of the In'dies, Spanish tribunal created by King Ferdinand in 1511 for the regulation of colonial affairs. When Columbus was preparing for his second voyage, 1493, Juan Rodriguez de Fonseca was appointed to assist him, and to arrange any matters concerning the new discoveries. This man, afterwards known as Bishop Fonseca, came to have great power in American affairs and was assisted by others, forming a kind of colonial board. Eventually it was merged into the Council of the Indies. As its powers were enlarged by Charles V this became a body of immense importance. It was, besides, the supreme judicial court of Spanish America and the E. Indies. It was subject only to the sovereign, who conferred with his ministers and with the Council of Castile.

Council of War, conference of military or naval officers, called by the commander in chief to advise him in relation to some important business or movement. The commandant of a garrison often solicits the opinion of a council of war before surrendering to the enemy; but in the military code leaves these matters to the discretion of the commander.

Count, nobleman of an order of nobility inferior to dukes and marquises, but superior to viscounts and barons. Counts had anciently territorial jurisdiction, but at present they

are simply noblemen having this hereditary title. Counts palatine were originally "officers of the imperial palace" in Germany, who possessed high judicial functions. The term was afterwards applied to feudatories who had palatine jurisdiction over outlying territories, where they maintained a palace and a court. The term came still later to be applied as a title of honor by several princes, but is now obsolete. Its English equivalent is "earl," and German, *Graf*.

Counterfeit (koun'tẽr-fĭt), that which is made in imitation of something else without legal authority and with fraudulent intent. Applied chiefly to spurious coin or bank notes, or other false currency. The uttering of such coins or notes is a felony punishable by imprisonment, or in some countries even by death. To guard against counterfeiting, bank notes are engraved with designs which cannot be reproduced except at great expense, and with secret marks and combinations of letters and figures known only to the proper authorities. A peculiar ink and paper are used, the manufacture or unlawful possession of which is made a criminal offense. Pamphlets called "detectors" are printed with lists and descriptions of counterfeit notes and coins.

Coun'ter-ir'ritants, group of substances used for the purpose of producing local inflammation, generally upon the external surface of the body, in order that they may influence deep-seated inflammation or congestion.

Coun'terpoint, the art of writing music in several distinct parts. The name is derived from the circumstance of the notes being placed one against or over the other in the score. See HARMONY.

Coun'ter Reforma'tion. See TRENT, COUNCIL OF.

Coun'tersign, a military watchword which must be given by persons wishing to cross the lines, so as to prevent the passage of spies or strangers. It is usually given out just before dark for the succeeding twenty-four hours, but may be changed at any moment, and is carefully communicated to commanders, sentries, and other proper persons. In the U. S. the name of a battle is ordinarily used as a countersign.

Coun'ty, originally the territory of a count or earl; in modern usage denotes a division of a state or kingdom. In England and Scotland the term is equivalent to shire. The term "shire" in England is not applied to those counties which were originally distinct sovereignties, such as Kent, Essex, Norfolk, Cumberland, and Sussex. Lancaster, Chester, and Durham are called counties palatine. The primary divisions of the provinces of Ireland are called counties. Each state of the U. S., except Louisiana, is divided into counties, each of which contains a capital or county town, in which the courthouse is located. In Louisiana the divisions are called parishes, but are similar to counties.

Coup d'État (kō dā-tä'), French "stroke of state"; violent and illegal exercise of power on the part of a government for the purpose of establishing, increasing, or retaining authority. A *coup d'état* differs from a revolution in that, whereas a revolution has for its purpose the overthrow or modification of the methods of a regularly organized and recognized government, a *coup d'état* aims at a firmer establishment or increase of the authority already established. A revolution is the result of political action taken by large numbers of men for a common but often indefinite purpose; while a *coup d'état* is the work of a single man who has a definite end in view, and who strikes quickly for the accomplishmen of his purpose. Revolution is often protracted; but a *coup d'état* invariably results in immediate success or failure.

Coup'ling, contrivance for fastening railway cars. The automatic coupler is a device by which two hooks become mutually engaged when the cars are brought together, the release being effected by working at the side of the cars a lever which raises the locking pin. Also, in mechanics, a means to connect shafting. The usual form is the flange or plate coupling in which two flanges are separately fitted on the ends to be attached, and are then secured together by screws, a convenient arrangement which can readily be fitted or removed. A coupling on an organ is a mechanism by which two or more rows of keys can be played together.

Courbet (kōr-bā'), **Gustave,** 1819–78; French painter; b. Ornans, Doubs; Director of Fine Arts in Paris, 1870; joined the Commune, 1871, ordered the destruction of the Vendôme column, was imprisoned six months, had his effects sold to pay the cost of reërecting the column, and after release spent the rest of his life in Switzerland. His paintings comprise portraits, landscapes, and genre pieces; was especially noted for studies of the nude female form; his canvases "Woman with a Parrot," "The Quarry," "Young Women of the Seine," and "Doe Run Down in the Snow" are in the U. S.

Courcelles (kōr-sĕl'), **Daniel de Remi** (Seigneur de), French Governor of Canada; sent to succeed Mézy, 1665; led an expedition on snowshoes against the Mohawks, aiding Tracy in their reduction; selected a site and planned a post on Lake Ontario to act as a barrier between the Ottawas and Iroquois; forced by ill health to return to France, he left the construction of the post (where Kingston stands) to his successor, Frontenac.

Courcelles, Thomas de, 1400–69; French theologian; Rector of the Paris Univ.; one of the judges who condemned Joan of Arc to death; defended the Gallican Church in the councils of Basel and Metz; conducted important negotiations for Charles VII.

Courier (kō'rĭ-ẽr), literally, a runner, a messenger or bearer of dispatches, usually on public business. According to Xenophon, couriers were first employed by Cyrus the Great. Herodotus speaks of the Persian *cassids* or foot messengers, who traveled with great rapidity. They were stationed in relays, one man

and one horse for each day's journey; and by these messengers Xerxes sent the news of his defeat to Persia (480 B.C.). Gibbon bears testimony to the rapidity with which communication was carried on in the Roman Empire by the regular institution of posts. The Mexican couriers, according to Prescott, traveled with incredible swiftness. The Peruvian *chasquis* or runners carried dispatches at the rate of 150 m. a day.

Cour'land, Baltic province; incorporated with Russia by the third partition of Poland, 1795; is bounded on the N. by the Gulf of Riga and on the W. by the Baltic; area, 10,435 sq. m.; pop. (1905) 674,437; capital, Mitau. The chief river is the Duna, which flows along the NE. border. The soil is in some parts very fertile, but there are many forests, lakes, and swamps. The greater part is occupied by Germans. Courland was originally an independent duchy, but acknowledged the feudal sovereignty of Poland in 1561, and later that of Russia.

Court, originally an inclosure or yard; the residence of a sovereign; a royal or princely household. In England and some other countries the term usually denotes the family and attendants of the sovereign, regarded in a public capacity. The term "court circle" is applied to the nobles, bishops, ministers of state, and other persons who are in the habit of approaching the sovereign and of associating with the other members of the royal family. See COURTS.

Cour'tesy Ti'tles, titles assumed by individuals, given by custom, but to which they have no legal claim. Such titles are common in countries where there are different orders of nobility, in which cases it is customary to give to the sons and daughters of a peer having several titles one of his inferior titles. A courtesy title has no effect on the legal status of the person to whom it is given, and does not raise him above the rank of the commoner. For example, the eldest son of the Duke of Bedford has the title of Marquis of Tavistock, and the eldest son of the Duke of Buccleuch has the title of Earl of Dalkeith. The younger sons of dukes and marquises take the title of "lord." The daughters of dukes, marquises, and earls have the courtesy title of "lady." A woman marrying a person with a title inferior to hers, or with no title, retains her own title as a courtesy title. In Scotland the eldest son of a viscount or baron has the title of "master."

Court Jes'ter, character in mediæval courts and noble families to entertain the household by amusing sallies. Court fools do not appear officially till after the crusades. They were at first either misshapen, half-imbecile dwarfs, or quick-witted, half-mad fellows, or poor and merry poets. The office ceased in most European countries about the close of the seventeenth century, but continued longer in Russia, where Peter the Great often had twelve fools. The fool's costume consisted of close-fitting doublet and hose, of two colors, counter changed, and a motley coat; a hood, ornamented with bells, covered head and shoulders. Yellow formed so large a part of these grotesque costumes that it became known as "fool's color." The jester carried a wand, terminating in a grotesque, grinning head, also ornamented with bells.

Court-mar'tial, in the army, navy, and marine corps, a tribunal for the examination and punishment of offenders against martial law or discipline. The subject of courts martial are usually officers or men in actual service, but when martial law prevails courts martial sometimes punish offenses committed by civilians. The sentences passed by these courts are usually subject to the approval of department commanders or other high officers, or even (in the U. S.) to that of the President.

Court'-plaster, so called because formerly used by fashionable ladies and courtiers in the form of black patches at first stuck on the face to hide a pimple or defect, and later used merely as a fashion and to produce by contrast greater brilliancy of the eyes and complexion. It is made of thin silk, usually black or pink, coated on one side with isinglass, and is used to cover slight wounds. See STICKING PLASTER.

Courts, in law, public tribunals established for the administration of justice and the interpretation and enforcement of the law. The protection of private rights, the punishment of criminal offenses, the regulation of conflicting interests of individuals and states, the exposition and application of legislative enactments, and, in some nations, even of constitutional provisions, are the various functions of courts. In modern times the courts have been rendered as independent of the government as possible. They are generally composed of distinct bodies of officials holding their positions during stated terms, and are under supervisory control only of superior, or appellate, organizations of a similar nature; and are confined to the decision of controverted questions presented to them by injured parties. Criminal cases are presented by the government, civil cases are brought either by states or individuals affected therein, of their own option. The courts on the Continent of Europe and in Scotland administer a system of jurisprudence derived from the civil or Roman law, while in England and the U. S. they apply a system called the "common law," in which the rule of precedent holds sway. In this system the mode of trial by jury was developed as a safeguard against oppressive action by the courts. The judge does not examine witnesses nor decide any questions except points of law, so that every inducement may be removed which would lead him to act as advocate instead of arbiter. A broad distinction is also drawn between actions which are termed legal and suits which are called equitable, the latter dispensing with a jury, administering a more adequate relief in many instances, and in various ways supplementing the deficiencies of the proceedings applicable to the former.

In countries whose systems are based on the civil law, the force of precedent is not

recognized as a controlling principle. Jury trials have only been introduced as a foreign system, are employed in a comparatively small class of instances, and are looked upon with so little favor that any extension of their application is thought undesirable. The judges, moreover, may engage directly in the examination of witnesses and prisoners, and not infrequently, particularly in criminal trials, appear to become strongly biased in their decisions. And lastly, no distinction of causes and remedies as legal or equitable is attempted. In accordance with the provision of the U. S. Constitution a regular system of Federal courts has been formed throughout the Union. The most important are the district courts, the circuit courts, circuit courts of appeals, and the court of claims. Final appeals are taken to the Supreme Court at Washington, which is composed of a chief justice and eight associate judges. All these tribunals exercise both law and equity jurisdiction. See EQUITY.

Cousin (kō-zăn'), **Jean,** abt. 1520–89; French painter and sculptor; b. Soucy; considered to be the founder of the French school of painting; many of his paintings on glass still exist; his "Last Judgment," on canvas, is in the Louvre; most important work in sculpture, the sepulchral monument of Admiral de Chabot; published treatises on perspective and portraiture.

Cousin, Victor, 1792–1867; French philosopher; succeeded Royer-Collard as professor at the Sorbonne, 1815; continued the teaching of the Scotch philosophy initiated by him, and promoted the reaction against the sensualism of Condillac and the thinkers of the eighteenth century; suspended in 1820, on political grounds; published editions of Proclus, 1820–27, and Descartes, 1827, and a translation of Plato, thirteen volumes, 1827. In 1827 he was replaced in his chair at the Sorbonne, and shared with Guizot and Villemain a great popularity and influence in the community; was, under Thiers, 1840, Minister of Public Instruction for eight months, and delivered in the Chamber of Peers his "Defense de l'Université et de la Philosophie." The Revolution of 1848 called forth, in refutation of socialism, his "Justice et Charité." His works also include "General History of Philosophy" and "Lectures on the True, the Beautiful, and the Good." His chief work is his "Fragments Philosophiques," 1826. His philosophy was eclecticism.

Couture (kō-tür'), **Thomas,** 1818–79; French historical and genre painter; b. Senlis; best-known picture, "The Decadence of the Romans," now in the Louvre, a work of wonderful power; a study for "The Volunteers of 1793" is in the Boston Museum of Fine Arts.

Cov'enant, in theology, the promises recorded in the Scriptures, made by God on certain conditions of obedience, faith, etc., on the part of man. The old dispensation (Old Testament) is the old covenant; and the new dispensation (New Testament), the new covenant. The so-called "Theology of the Covenants" or "Federal System," elaborated by Cocceius (1603–69), is the theology of the Westminster standards.

Covenant, Na'tional, of Scotland, agreement to protect the Reformed religion in the Church of Scotland from the attempt of the English Govt. to enforce the Episcopal form of worship; drawn up and published by the Four Tables in Edinburgh, March 1, 1638. It professed to be based on a document which James VI had signed in 1580. The Four Tables, as they were called, consisted of (1) nobility, (2) gentry, (3) ministers, and (4) burgesses; and in their hands the whole authority of the kingdom was vested. They elected a general assembly which met at Glasgow, November, 1638, and abolished episcopacy; ordering that every person should sign the Covenant on pain of excommunication. The Covenanters prepared for war, and though a treaty of peace was concluded in June, 1639, they entered England in August, 1640. An agreement was signed at Ripon, October, 1640, by which commissioners were to decide the points in dispute. In 1643 the English parliamentary party, at war with the king and in need of aid from the Scotch, made an alliance with the latter, which, under the name of the Solemn League and Covenant was signed in September by most of the members of the English House of Commons and the Assembly of Divines and by civil and military officers. Officers of the universities and persons over eighteen years of age were required to sign it. By this agreement the Scotch came with an army to support the English against Charles I on condition that Presbyterianism should be introduced in England and Ireland.

Cov'enanters, (1) the signers of the Covenant in Scotland and those who after the Restoration adhered to the Covenant; more specifically, (2) the religious body founded by Richard Cameron abt. 1680 (see CAMERON and CAMERONIANS), and now represented by the Reformed Presbyterian churches.

Cov'ent Gar'den (a corruption of convent garden, so called because it was once the garden of Westminster Abbey), a square in the W. central district of London, well known for its market for vegetables, fruits, and flowers. The square was formed in 1632 from the design of Inigo Jones, and was first used as a market in 1656. The market consisted of an unsightly array of sheds until 1828, when the present building was erected by the Duke of Bedford. There is also an opera house in Covent Garden.

Cov'entry, city in Warwickshire, England; on the Sherbourne; 94 m. NW. of London; ancient part has narrow, crooked streets; modern part well laid out; notable buildings include St. Michael's Church (1313) with spire 300 ft. high, said to be the largest parish church in England; manufactures embrace fringes, watches, cotton and woolen goods, and art-metal goods, and the city is the greatest emporium for ribbons in England. It is a place of great antiquity, its name appearing in the "Doomsday Book" as Couentrev, mean-

ing in the old British tongue "town on the Couen." In 1043 Earl Leofric and his wife, Lady Godiva, founded here a magnificent Benedictine abbey. Pop. (1901) 69,978.

Cov'erdale, Miles, 1487–1568; English prelate; b. Yorkshire; an Augustine monk, 1514; adopted the doctrines of the Reformed Church of England, 1526; engaged in evangelistic work; assisted Tyndale in his translation of the Bible; published one of his own, the earliest entire English Bible, 1535; Bishop of Exeter, 1551; deprived of office and imprisoned on accession of Mary; translated from the works of Luther, Calvin, Bullinger, and other reformers.

Cov'ington, capital of Kenton Co., Ky.; on the Ohio River opposite Cincinnati, just below the mouth of the Licking, which separates it from Newport; manufactures of liquors, flour, glass, cotton and woolen goods, tobacco, stoves, carriages and wagons, and rolling-mill products. The city was settled in 1812; laid out, 1815; incorporated, 1834. Pop. (1906) 46,436.

Cow. See CATTLE.

Cow'bird, or Cow Bunt'ing, a bird of the U. S. belonging to the blackbird family. The male is glossy black with a brown head, the female grayish brown. It takes its name from the fact that it associates with cattle in pastures, probably for the purpose of catching the insects which are aroused by the cattle. Like the European cuckoo, it builds no nest, but deposits its eggs in the nests of other and usually smaller birds, such as warblers and finches. As a rule but one egg is placed in a nest.

Cow'boys, marauders, mostly consisting of Tory refugees, who during the Revolutionary War adhered to the British interests and infested the neutral ground in Westchester Co., N. Y., between the American and British lines, plundering the Whigs, or those who adhered to the interests of the Continental Congress. They received the name of cowboys because they stole many cattle. In the U. S. the name is now applied to men who take care of cattle in the West and Southwest. The two regiments of "Rough Riders" in the Spanish-American War, many of whom were cowboys, were active in the early part of the Santiago campaign in Cuba.

Cowes (kowz), British seaport on the N. coast of Isle of Wight; on both sides of the Medina River; headquarters of the Royal Yacht Club; has many elegant villas and hotels, and Osborne House, the villa of Queen Victoria; a fashionable resort. Pop. (1901) 8,652.

Cowhage (kow'hāj), sometimes called MUCUNA, a drug which consists of the hairs of the pods of *Mucuna pruriens* (of the *Leguminosæ*), a long twining plant with large trifoliate leaves and dark-purple or dark-greenish flowers, and largely cultivated in both the E. and the W. Indies. The hairs are about ⅛ in. long, and of a glossy brown color. They easily penetrate the skin and produce an intolerable itching, which instead of being relieved by washing or rubbing is greatly increased. Very little is known of the chemical composition of the drug. It was originally employed as a vermifuge, but is now little used. At one time it was made into an ointment and used as a counterirritant on limbs which were suffering from paralysis, but this treatment may be distinctly harmful by irritating the surface of limbs which are already in a condition of bad nutrition.

Cow'ley, Abraham, 1618–67; English poet; b. London; published a volume of poems when fifteen years old; produced a comedy, "Love's Riddle," while at school; entered Cambridge, 1636; expelled as a royalist, 1643; went to Oxford; accompanied the queen to Paris, 1646; secretary to Lord Jermyn; returned to London, 1656; arrested as a royalist, but soon released; again lived in Paris, 1658–60; buried in Westminster Abbey.

Cow'pens, village of Spartanburg Co., S. C.; 100 m. NNW. of Columbia; where Gen. Morgan defeated a British force under Col. Tarleton, January 17, 1781; British lost 300 killed and wounded; the Revolutionary force took 500 prisoners, 2 cannon, 800 muskets, and 2 standards; had 12 killed and 60 wounded.

Cow'per, William, 1731–1800; English poet; b. Great Berkhampstead; son of John Cowper, chaplain to George II; called to the bar, 1754, but never practiced; afflicted with attacks of insanity all his life; chief works, "The Progress of Error," "Truth," "Table-talk," "Expostulation," all brought out in 1781; "John Gilpin," 1782; "The Task," 1783; a translation of Homer, 1791; and "The Castaway," 1799. He gave to English taste a simpler and more earnest cast.

Cow'rie, or Cow'ry, a common name for the seashells of the genus *Cypræa*, often termed porcelain shells from their smooth, polished appearance. Many are beautifully marked with rich colors. There are about 200 species, the majority being from the Indian and Pacific oceans. One small species is still used as a medium of exchange in parts of Africa.

Cow'slip, the common name in Great Britain of a variety of the native primrose, a low-growing herbaceous perennial bearing an umbel of small yellow flowers. The species is separated into three races: (1) flower stalk one-flowered, primrose; (2) flower stalk bearing several umbelled small flowers, cowslip; (3) flower stalk bearing several umbelled large flowers, oxslip. The *Dodecatheon meadia* is the American cowslip; it grows in the W. U. S. In the U. S. the marsh marigold is often called the cowslip.

Cow Tree, tree of the tropics whose juice is used as food. They are found in separated families; in all cases, however, the milky product is derived from cells or tissues of the stems, and is not the proper juice of the plant.

Cox, David, 1783–1859; English landscape painter; b. near Manchester; first a scene painter; took up art study in London, 1804; left 100 paintings in oil, but is best known

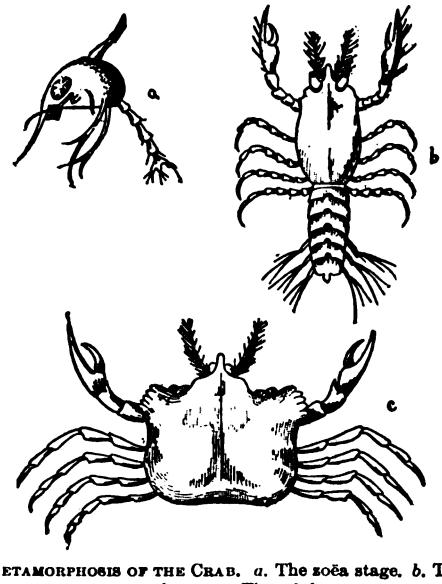
for his water colors, chiefly on Welsh subjects; published "Treatise on Landscape Painting in Water Colors."

Coyote (kī'ō-tē or kī'ōt), the small barking or prairie wolf, abundant in the W. and SW. U. S. and parts of Mexico.

Coypel (kwä-pĕl'), **Natalis** or **Nŏel,** 1628–1707; French painter; b. Paris; produced pictures of "Solon," "Trojan," "Alexander Severus," etc.; decorated rooms in the Tuileries; executed many works at Fontainebleau; painter to the king and prominent director of the Royal Academy in Paris.

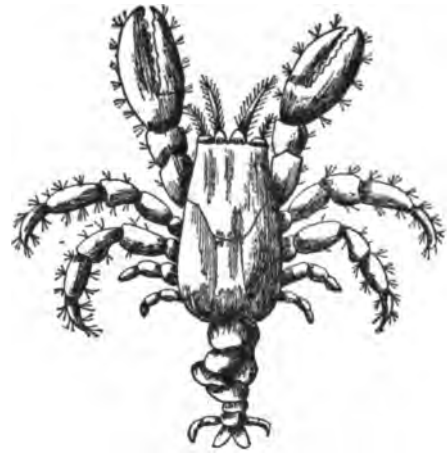
Coxal'gia. See HIP JOINT DISEASE.

Crab, common name of various animals, most of which belong to the order *Decapoda.* Over 1,000 kinds of true crabs are known, most of which have no common names. Crabs live generally on decayed animal matter, though some feed on plants. The male fiddler crab has one pincer enormously developed, so that it is likened to a violin. Fiddler crabs are amphibious, and live in large colonies in holes in



METAMORPHOSIS OF THE CRAB. *a.* The zoëa stage. *b.* The megalops. *c.* The adult.

the seashore in the warmer parts of the world. The hermit crab has a soft abdomen, hence is exposed to injury. To protect itself this crab inserts its hinder body into the cavity of some cast-off snail shell, which, held in position by the modified legs of this region, is carried about by the crab. At the approach of danger the crab retreats into the shell, closing the opening by the hard pinching claws. Hermit crabs occur in all the seas of the world, some living on the shore, others in deep water. The oyster crab is a small round crab with thin shell and weak legs, the female of which spends its life inside the shell of the oyster. Soft-shelled crabs are members of the group of swimming crabs, in which the body is produced in either side into a long sharp spine, while the hinder feet are flattened into an oar. Like all crabs, these swimmers periodically cast the old shell, and, when taken before the new



HERMIT CRAB FROM THE INDO PACIFIC SEAS.

shell is hardened, they form the soft-shelled crabs of the table. Many hundred species of small-bodied, long-legged crabs (*Maioidea*) are known as spider crabs. The palm crab of the E. Indies is a near relative of the hermit crab.

Crab Ap'ple (*Pyrus coronaria*), a small tree growing wild in the U. S., bearing rose-colored fragrant blossoms and fragrant greenish fruit, which is prized for preserves. Another wild crab apple, the *Pyrus angustifolia,* also grows in the S. States. The cultivated crab apple is the *P. baccata,* a native of Siberia. (See APPLE.) The term is commonly used to denote any small and sour hard apple which is fit only for culinary purposes.

Crabbe (krăb), **George,** 1754–1832; English poet; b. Aldborough, Suffolk; curate of Strathern and later of Trowbridge, Wiltshire; works include "The Village," "The Parish Register," "The Borough," and "Tales in the Hall"; was distinguished for his vigor and the "Chinese accuracy" of his observation.

Cracow (krā'kō), city in Austrian Poland; on the Vistula; 158 m. SSW. of Warsaw; has a castle built abt. 700 A.D., when the city was founded. Cracow was the capital of Poland, 1320–1609; the kings continued to be crowned here until 1764. On the third partition of Poland (1795) it was annexed to Austria. It belonged to the duchy of Warsaw, 1809–12. The Congress of Vienna, 1815, formed it, with a small territory, into a free state, as a protectorate of Russia, Austria, and Prussia. In 1846 it was again annexed to Austria. Pop. (1900) 91,323.

Craig (krāg), **John,** 1512–1600; Scottish reformer; entered the Dominican order, and had charge of the novices at Bologna; converted to the Reformed Church by Calvin's "Institutes," he was tried and condemned to be burned by the Inquisition, but saved by a mob; returned to Scotland, 1560; colleague of John

Knox in Edinburgh, 1563; chaplain to James VI, 1579, and took part in the composition of the National Covenant, 1580.

Craik (krāk), **Dinah Maria Mulock,** 1826-87; English novelist; b. Stoke-upon-Trent. Her best novels are "The Ogilvies" and "John Halifax, Gentleman." Besides novels and other works, she published a volume of poems.

Craik, George Lillie, 1799–1866; Scottish author; b. Fife; Prof. of History and of English Literature in Queen's College, Belfast, 1849–66. Wrote "The Pursuit of Knowledge under Difficulties" and other works for the Society for the Diffusion of Useful Knowledge; aided in the preparation of Knight's "Pictorial History of England"; contributed to the "Penny Cyclopædia"; published "Manual of English Literature," "Spenser and his Poetry," "The Romance of the Peerage," "The English of Shakespeare," etc.

Cramp'ton's Gap, pass in the South Mountains, near Burkittsville, Frederick Co., Md.; scene of an engagement, September 14, 1862, between Confederates under Cobb and the left wing of McClellan's army under Franklin. The defense of the gap was unavailing, the Confederates being forced out with severe loss.

Cranach (krä'näkh), or **Kra'nach, Lucas,** called THE ELDER (family name SUNDER), 1472–1553; German painter and engraver; b. Kronach near Bamberg, Saxony; court painter at Wittenberg for many years, also burgomaster; was so rapid and prolific a worker that he was called *pictor celeberrimus*; was a friend of Luther and Melanchthon, whose portraits he painted and engraved; most important picture, an altarpiece at Weimar; engravings include a set of the "Passion of Christ" and a "St. Jerome in the Desert."

Cranach, Lucas von, 1515–86; German portrait painter; son of the preceding; burgomaster of Wittenberg. A good specimen of his work is in the Metropolitan Museum, New York, entitled "Portrait of a German Lady."

Cran'berry, Moss'berry, or **Moor'berry,** fruit of several species of small, mostly prostrate



CRANBERRY.

evergreen shrubs, of the family *Ericaceæ*, genus *Vaccinium*. The species are natives of the colder regions of the N. hemisphere. The fruit is acid, and is in great request for making sauces, jellies, etc. *Vaccinium oxycoccus* is a native of the N. parts of Europe, Asia, and America. It grows in marshy grounds, and is a wiry, creeping shrub, with small oval leaves, and small but beautiful blossoms, of a deep rose color.

The cranberry of U. S. markets, the V. macrocarpum, is a larger plant than the European species; is gathered extensively from wild bogs, particularly in the Cape Cod region, in New Jersey, Wisconsin, Long Island, and Michigan.

Crane, machine employed to raise heavy weights and to deposit them at some distance from their former position; has two kinds of motion, a lifting and a horizontal one. The simplest form of crane has an upright post, moving round a vertical axis, a swinging arm jointed to the post at its lower end and fastened to the post by means of a pulley at its outer end, and a winch or other hoisting tackle. Modern cranes for use in lifting parts of machinery, finished and unfinished castings, rails, etc., are equipped with powerful electromagnets, which save time in loading and unloading. See DERRICK.

Crane, any bird of the order *Grallæ* or *Alectorides*, family *Gruidæ*, of which the genus *Grus* alone occurs in the U. S. They are nearly all large birds, with long necks, long legs, and powerful wings. The common European crane is about 4 ft. high, ashen gray in color, with face and neck nearly black. It breeds



AMERICAN CRANE.

in marshes in N. Europe and Asia, migrating to warmer climes on the approach of winter. Cranes migrate in large flocks, flying at a great height, and like geese in a V-shaped body. The whooping crane is larger than the common crane, which it resembles, except that its adult plumage is pure white, the wings tipped with black. It frequents the S. parts of the U. S. in winter; in summer it migrates N. The U. S. has also the sand-hill crane and the little crane. To this family belongs also the demoiselle or Numidian crane. Cranes use their bills as a weapon of defense, attacking the eyes of an assailant.

The Balearic crane (*Balearica pavonina*) is a beautiful crane found in N. and W. Africa, conspicuous for its crown of golden plumes and its scarlet cheeks. It is readily tamed, often indulging in fantastic dances, running about with great speed, and screaming with a harsh and ringing voice. It is of a bluish-slate color, and is 4 ft. high. It is exceedingly gentle, and, unlike some other cranes, is quite harmless.

Cran'mer, Thomas, 1489–1556; English reformer; b. Aslacton, Nottingham; chaplain to Henry VIII, 1529; Archbishop of Canterbury, 1532; promoted the translation and circulation of the Bible; one of the regents of the kingdom, 1547; headed a commission which composed the liturgy of the Anglican Church, 1548, and supported the Reformed cause during the reign of Edward VI; on the accession of Mary, 1553, he was imprisoned on a charge of treason; also accused of heresy, and induced to recant and to subscribe to the doctrines of papal supremacy and the real presence; nevertheless, owing to the persistence of his enemies, he was burned at the stake in Oxford.

Cran'nog, fortified island, such as are found in the lakes of Ireland and Scotland, and which were used as dwellings and places of refuge by the ancient Celtic inhabitants. The area of a small isle in some cases was enlarged by wooden piles or heaps of stones.

Crape, a light, transparent fabric, made of raw silk deprived of its gloss. Crapes are crisped or smooth, according to the degree of twist in weaving. They are made in Italy, England, and France, and are much used for mourning dresses.

Crash'aw, Richard, abt. 1613–49; English poet; b. London; became a fellow of Peterhouse, Cambridge Univ., 1636; in 1644 was ejected therefrom for refusing to sign the Covenant; going to France he became a Catholic and subcanon at Loretto, where he died. His works include the sacred poems entitled "Steps to the Temple" and "Carmen Deo Nostro," the secular "The Delights of the Muses." It was he who wrote the immortal line on the miracle at Cana, "Lympha pudica deum vidit et erubuit" (the modest water saw its God and blushed).

Cras'sus, Marcus Licinius, abt. 108–54 B.C.; Roman triumvir; elected prætor, 71 B.C.; defeated Spartacus, the leader of an insurrection of slaves; consul as the colleague of Pompey, 70 B.C.; united with Cæsar and Pompey in a coalition called the first triumvirate, abt. 60. Crassus and Pompey having been chosen consuls, 56, the former obtained command of Syria for five years; invaded Parthia in 54, in order to enrich himself by plunder; defeated with great loss by the Parthian general Surena, near Carrhæ (the Haran of the Bible), 53 B.C.; treacherously killed at a conference with Surena soon after that battle.

Cra'ter, the orifice or mouth of a volcano, through which the lava and ashes are ejected. The opening may be at the top, in which case it is called central; or it may be at the side, lateral. There may also be several subsidiary craters, which may shift their places or become merged by subsidence into others.

Cra'ter Lake, in the W. part of Klamath Co., Ore.; is oval in form, with diameters of 6 m. and 5 m., and 2,000 ft. deep. Its surface lies at an altitude of 6,240 ft. From its margin rise cliffs, the peaks of which are from 1,500 to 2,000 ft. above the water. It is fed by springs and has no visible outlet; it occupies the crater of an extinct volcano.

Crat'erus, d. 321 B.C.; Macedonian general; one of the successors of Alexander the Great; served under that prince in Asia, and was one of his favorite generals. After the death of Alexander was associated with Antipater in the government of Macedonia; was defeated by Eumenes, and killed in battle in Cappadocia.

Cra'tes of Mal'lus in Cilicia, Greek grammarian of the second century B.C.; founder of the Pergamene school; commentator on Homer and determined opponent of Aristarchus; sent by Attalus, abt. 167 B.C., to Rome as an ambassador, he broke his leg, and, being thus detained, delivered the first lectures on grammar ever delivered in Rome.

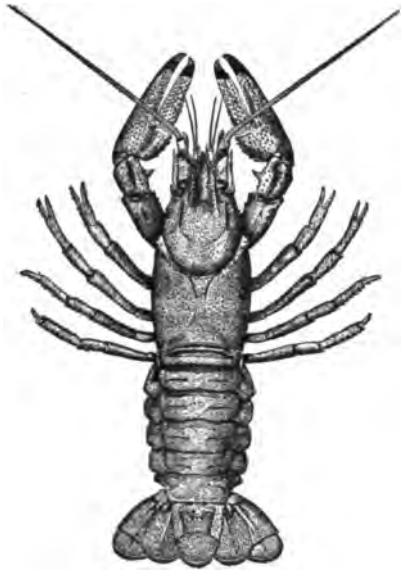
Crati'nus, d. 422 B.C.; Athenian comic poet; wrote the "Archilochi" and twenty other plays, nine of which were successful in the Dionysiac contest; won a victory over the "Clouds" of Aristophanes by his "Wine-flask"; one of the three great masters of the old comedy.

Cratip'pus, b. abt. 75 B.C.; Greek Peripatetic philosopher; b. Mytilene; the most eminent philosopher of that age in the estimation of Cicero, who was his pupil and friend. The only work attributed to him is "On Divination by Dreams."

Cra'ven, Tunis Augustus Macdonough, 1813–64; American naval officer; b. Portsmouth, N. H.; entered the Naval Academy, 1829; took part in the conquest of California; surveyed Isthmus of Darien for a ship-canal route, 1857; early in Civil War engaged in searching for Confederate cruisers; blockaded the *Sumter* at Gibraltar till her crew deserted her; attached to Farragut's squadron, off Mobile, his ship, the *Tecumseh* being given the post of honor. Here, in pursuing the Confederate ram *Tennessee,* August 5, 1864, he ran on a line of torpedoes, losing his vessel, his own life, and the lives of nearly all of his crew. He has been called "the Sydney of the American navy."

Craw'fish, or Cray'fish, several long-tailed crustaceans. They inhabit fresh water, and dig long burrows in the earth. The mother carries the young under her tail. They feed on insects, mollusks, dead animals, etc. By some they are esteemed for the table. Crawfishes do immense damage by opening passages

for water through the levees of the Mississippi. Certain salt-water crustaceans are



THE CRAWFISH OR CRAYFISH.

popularly called crawfishes, especially the spiny lobsters.

Craw'ford, Francis Marion, 1854–1909; American novelist; son of Thomas Crawford, the sculptor; traveled in India, where he edited a newspaper at Allahabad. This experience furnished the material for his first fiction, "Mr. Isaacs," 1882; resided at Sorrento, Italy, for many years; other novels include "Saracinesca," "Pietro Ghisleri," "Casa Braccio," "Taquisara," "Corleone," "Via Crucis," "In the Palace of the King," "Ave, Roma Immortalis," "Fair Margaret," "Southern Italy," "Lady of Rome," "The White Sister," etc.

Crayfish. See CRAWFISH.

Cream of Tar'tar, or Potas'sae Bitar'tras, a compound contained in grape juice and deposited from it in the process of fermentation. The crystalline deposits are called crude tartar, or argol, which when purified yields cream of tartar, the acid tartrate of potassium, $KH_5C_4O_6$. This salt is hardly soluble in water, and insoluble in strong alcohol. It is frequently adulterated. It is used with bicarbonate of soda, as a substitute for yeast in raising bread; in dyeing wool; in medicine for its cathartic, diuretic, and refrigerant properties. It is also used in preparing soluble tartar, Rochelle or Seignette salts, tartar emetic, tartarized iron, white and black flux, etc.

Cre'asote. See CREOSOTE.

Crea'sy, Sir Edward Shepherd, 1812–78; English historian; b. Bexley, Kent; called to the bar at Lincoln's Inn, 1837; Prof. of History in University College, London, 1840; Chief Justice of Ceylon, 1860; chief works, "Fifteen Decisive Battles of the World," and "History of England."

Cre'atine, compound discovered, 1835, by Chevreul; found in the flesh of many if not all vertebrate animals; now considered one of the products of the normal destruction of the tissues; occurs in the urine.

Crécy (krā-sē'), small town of France; department of Somme; 12 m. N. of Abbeville; scene of a victory by Edward III with 40,000 English soldiers over a French army of 100,000, August 26, 1346; nearly 30,000 French were killed. Pop. abt. 1,500.

Credi (krā'dē), **Lorenzo di,** abt. 1453–1536; Italian painter; b. Florence; fellow pupil of Verrocchio and Leonardo da Vinci; most esteemed works, "Madonna and Child with Saints Julian and Nicholas," in the Louvre Gallery, and "Birth of Christ," at Florence.

Cred'it, in bookkeeping, abbreviated as *Cr.*, the reverse of *debit*, denoting in personal accounts those items or values received from the party named at the head of the account. The term credit or creditor is also applied to the side of an account book on which are entered all moneys, goods, etc., received by the party that keeps the book. In political economy, credit means the power of borrowing money on other property, whether by nation or by individuals. In a majority of cases loans are made by persons who wish to retire from business, or who have more capital than they can advantageously employ, to parties entering into business or who wish to increase their business. "Public credit" means the general confidence placed in the solvency of a state, and in its fidelity as well as its ability to pay its debts, or at least the interest on the same.

Crédit Foncier (krā-dē' fōn-sē-ā'), in France, a plan of borrowing money by mortgaging land (for a sum not exceeding half its value), and repaying the borrowed money and interest in small and regular installments.

Cred'it, Let'ters of. See LETTERS OF CREDIT.

Crédit Mobilier (krā-dē' mō-bē-lyā'), gigantic scheme or joint stock company which originated in France, 1852, sanctioned by the government, with a capital of 60,000,000 fr. Its objects were: (1) To initiate trading enterprises of all kinds on the principle of limited liability; (2) to supersede or buy up trading companies — *e.g.*, railway companies — and to substitute scrip and shares of its own for the shares and bonds of the company; and (3) to carry on the business of a bank or bankers on the principle of limited liability. In 1855 its dividends amounted to forty per cent. It went into liquidation 1867.

The Credit Mobilier of America is the title of an organization chartered in Pennsylvania, 1859, as a corporation for a general loan and contract business, and reorganized, 1864, with the intention of enabling the shareholders of the Union Pacific Railway and others to reap enormous profits. The honesty of its management having been impeached, its affairs received (1872–73) an investigation from Con-

gress, certain members of which were charged with having unlawfully profited by the enterprise.

Creed, summary of doctrines of Christian belief. The Church of England accepts three such creeds—the Apostles', Athanasian, and Nicene, together with the Thirty-nine Articles; the Church of Rome accepts the three and adds a fourth, that of the Council of Constantinople; the Lutheran Church accepts the three and has several confessions, catechisms, and formulas; the Presbyterian churches accept the Westminster Confession and the two catechisms; the Congregational and Baptist churches have articles based on the Westminster Confession; the Greek Church has no symbolical books, strictly speaking, but approves the "Answers of the Patriarch Jeremiah to the Lutherans," the "Orthodox Confession of Peter Mogila," and the "Eighteen Articles of the Synod of Bethlehem"; and the Russian Church, besides the Greek documents, has catechisms and special works of its own. See DOGMA; FAITH, ARTICLES OF; FAITH, CONFESSIONS OF.

Creeks, confederacy of N. American Indians, forming the largest division of the Muskhogean family; at present constituting the Creek Nation, otherwise known as one of the Five Civilized Tribes; occupying a reservation of over 3,200,000 acres in Indian Territory, on which there are forty-nine towns; capital, Okmulgee; number, 1904: Creeks by blood, 9,905; Creek freedmen, 5,473. Their history begins with the appearance of De Soto's army in their country (Alabama, Florida, and Georgia), 1540, and its most striking feature was their revolt against the Americans, 1813–14, when they were defeated by Gen. Jackson. The larger part of the Creeks and the Seminoles (who had waged war in Florida for many years) were removed to Indian Territory, 1836–40. They now have a head chief, a legislature composed of a House of Kings and a House of Warriors, corresponding to the two Houses of Congress, an excellent educational system, and a reservation rich in natural resources, and, though steadily decreasing in numbers, they are thrifty and prosperous.

Creep'ers. See CLIMBING PLANTS.

Crees, tribe of N. American Indians, belonging to the Algonquin family, whose former habitat was in Manitoba and Assiniboia; now living in Manitoba (10,000) and the Northwest Territory (5,000); known to Jesuit missionaries as early as 1640; closely related by language and customs to the Chippewas, and believed to be an offshoot of the latter.

Crefeld (krā'fĕlt), manufacturing town of Rhenish Prussia, 13 m. NW. of Düsseldorf; well built, and has more extensive manufactures of silk than any other town in Prussia; also of cotton, linen, and woolen fabrics, lace, earthenware, etc. Ferdinand of Brunswick defeated the French here, 1758. Pop. (1900) 106,893.

Creighton (krā'tŏn), **Mandel,** 1843–1901; English prelate; b. Carlisle; ordained priest, 1873; Canon of Worcester Cathedral, 1885; in 1884 Prof. of Ecclesiastical History in Cambridge; Bishop of Peterborough, 1891; Bishop of London, 1896; author of a "History of the Papacy during the Period of the Reformation" (his most important work); "Primer of Roman History," "The Age of Elizabeth," "Primer of English History," "Cardinal Wolsey." He represented Emmanuel College at the Two Hundred and Fiftieth Anniversary of Harvard College, 1886, when he received the degree of LL.D.

Crema'tion, act or custom of burning the dead, especially as a substitute for earth burial. The custom, which is one of great antiquity, prevailed in E. Asia and W. Europe, and was observed by not a few N. and S. American Indian tribes. The few instances of cremation given in the Old Testament narratives seem to indicate that the Jews resorted to it rarely. The Phrygians are believed to have introduced the practice into Greece, where, as Homer shows, it was common at the time of the Trojan War, although it did not supplant earth burial; the Romans borrowed it from the Greeks, or perhaps from the Etruscans. Cæsar relates that the Gauls burned their dead, and the relics and urns found in burial mounds of Germany, Denmark, Scandinavia, and Great Britain, testify to the prevalence of cremation in N. Europe in the "bronze age," if not at a later period.

Cremation was unknown among the early Christians, chiefly because those who had come out of Judaism had inherited the custom of entombing the dead, and that method was hallowed by the burial of Jesus; with the spread of Christianity, the custom was perpetuated, and cremation came to be looked upon with abhorrence, largely because it seemed inconsistent with a belief in the resurrection. The burning of the body of Shelley and that of his friend Edward Williams, 1822, and one which occurred in S. Carolina earlier in the nineteenth century, are among the few instances of the occurrence of cremation in Christian lands before 1869. At the present day, in India and other E. countries, as well as in Japan, the dead are usually burned, and in India, until 1847, it was a common practice for a wife to burn herself in a funeral pile along with the body of her husband. Some native tribes of NW. British America still dispose of dead bodies by cremation.

In 1874 a society for the promotion of cremation was formed in London, and, 1878, a crematory was built at Woking, Surrey; but the first cremation in England did not take place until 1882. In 1884 the act was declared legal in Great Britain, under certain conditions. In 1876 Dr. Francis J. Le Moyne erected a crematory near Washington, Pa., and in December the body of Baron de Palm, who had died in New York, was burned. Cremation is now very general in Italy, where it was legalized in 1877. Paris, Gotha, and other Continental cities have crematories, and societies advocating the measure exist in countries where it is still prohibited. In some places, as at Gotha, columbaria are attached to the crematory temple. In the U. S. crematories have been built in a number of places. See FUNERAL.

Crémieux (krā-mĭ-ŏh'), **Isaac Adolphe,** 1796–1880; French advocate and republican; b. Nîmes; practiced in the court of cassation in Paris; in 1842 was elected to the Chamber of Deputies, in which he acted with the Radical Party; Minister of Justice in the provincial government (1848); member of the National Assembly, 1849–50; 1870, Minister of Justice after the deposition of Napoleon III; as President of the Universal Israelite Alliance of Paris, he displayed a remarkable activity in behalf of the Jews all over the world.

Crem'nitz. See KREMNITZ.

Cremo'na, city of Italy; capital of province of same name; on the Poe; 47 m. SE. of Milan; Cremona has manufactures of silk and cotton fabrics, porcelain, and chemicals; formerly celebrated for the violins of the Amatis, of the Guarneris, and of Stradivari. Cremona was a populous town of the ancient Roman empire. Pop. (1901) 37,693.

Cre'ole, native of the W. Indies or S. America descended from Europeans. The term is sometimes applied erroneously, and not in the W. Indies, to those whose ancestors were partly white, and have in their veins some blood of the Indians or negroes.

Cre'osote, sirupy liquid obtained chiefly from wood tar, and especially from coal tar. Wood-tar creosote has a penetrating odor resembling wood smoke. It is an antiseptic, and a remedy in phthisis. Coal-tar creosote is used for preserving timber from rotting, for softening hard pitch, as a fuel, and as a cattle wash to destroy parasites.

Cres'cent, figure of the new moon. The standard of the Turkish army bears the figure of a crescent; the word "crescent" itself is often used figuratively for the Turkish military power. It had also been the emblem of the Greeks before the conquest of the E. empire by the Turks, and was used by Genghiz Khan's Tartars and other nations of Ceneral Asia.

Cres'ses, plants having a pungent taste and diaphoretic and other medicinal qualities; belonging chiefly to the natural order *Cruciferæ*, and found in the temperate and N. parts of the earth. Many are used as food. The common cress, an annual and a native of Asia, has been introduced into other countries. It is used to counteract scurvy during Arctic voyages. The Virginia cress is cultivated as a salad in N. America, the W. Indies, and Great Britain. The bitter cress, the lady's smock, or cuckooflower, as it is called in England, and the hairy cress are both found in Europe and N. America. Water cress is a perennial, aquatic plant, used as a spring salad, and is a native of almost all parts of the world. The leaves have a pungent taste, to which is added a little bitterness and saltness. It grows best in shallow running water with a bottom of sand.

Cres'sy. See CRÉCY.

Crest, something worn on the helmet in ancient warfare. Among the Greeks it was often of horsehair, forming a stiff ridge along the top, but falling in a long soft appendage behind the nape of the neck. Among the Romans it was sometimes of stiff upright feathers, but was not in general use as an ornament. In the Middle Ages, as the helmet often covered and concealed the face, the crest became a means of knowing the wearer. It was often very elaborate, made of thin metal or of boiled leather, and painted in rich colors.

Creta'ceous Pe'riod, division of geologic time following the Jura-Trias and preceding the Eocene. In England and France, where the name was first used, the principal formation representing the period is of chalk, and chalk beds are also found in Texas and Arkansas, but in other regions the name is not descriptive of the character of the rock. The animal and vegetable life of the period shows a great variety, including shells, large flying reptiles, and toothed birds. Cretaceous rocks have a great development in N. America. They occupy a belt on the Atlantic coastal plain from New Jersey to Texas; cover an immense area on the Great Plains from Texas to Athabasca; reappear frequently among the mountain ranges of Wyoming, Colorado, Utah, Arizona, and New Mexico; are greatly developed in the mountains of NE. Mexico; and appear at many points on the Pacific coast from California to British Columbia. W. of the 100th meridian they contain an important store of coal, that when fully explored may be found to exceed that of the Carboniferous rocks of the Mississippi basin and Appalachian region.

Crete, or **Can'dia,** island of the Mediterranean; 160 m. long, 5 to 15 m. wide; area, 3,365 sq. m.; pop. (1900) 303,543; surface mountainous; Mt. Ida rises near the middle of the island to the height of 7,674 ft.; numerous caverns occur, and an extensive one near Mt. Ida is fabled to have been the retreat of the Minotaur; among the minerals are limestone and slate; chief products, cotton, tobacco, olive oil, grapes, oranges, lemons, wine, silk, and wool; population in ancient times believed to have amounted to 1,200,000, and when it was acquired by the Venetians to 500,000. Crete is considered the cradle of the civilization brought to Europe by the Phœnicians and Egyptians. According to tradition, Minos, a celebrated legislator, reigned over Crete before the historical period. In the time of Homer, Crete had a dense Hellenic population, and a number of flourishing cities. Crete was visited by the Apostle Paul, who planted a church in it. The Venetians became masters of this island, 1204. The Turks conquered it from the Venetians, 1669. In 1866 the Christian inhabitants revolted against the Turks, and demanded annexation to the Kingdom of Greece. This war excited much sympathy among Christian nations, but the Cretans were subdued, 1869. They obtained a constitution, but bad government caused insurrections, 1897, resulting in evacuation by the Turks, 1898, and the appointment of Prince George of Greece as High Commissioner of the great powers.

Cre'tinism, form of congenital disease in which mental and physical deformities are

prominent; found especially in certain parts of Switzerland and central Europe, in the Himalayas and in other parts of Asia, and to a slight extent in America. Cretinism is recognized to be dependent upon disease of the thyroid gland, or at all events some of the prominent symptoms depend upon such disease. The cretin is imbecilic or idiotic, and may be completely devoid of capability for intellectual development. Cretinism is now treated with extract of the thyroid gland.

Crétineau-Joly (krā-tē-nō' zhō-lē'), **Jacques,** 1803–75; French author; b. Fontenay; studied theology; wrote a number of works in defense of royalty and the Catholic Church; best known by his "History of the Jesuits" (six volumes, 1844–46), an elaborate work in defense of that order and at their request.

Creusot (krō-zō'), **Le,** town of France; department of Saône-et-Loire; 12 m. SSE. of Autun; in the midst of rich mines of coal and iron; has extensive blast furnaces, foundries, machine shops, and glass works. It is the seat of the iron works of Schneider & Co., ranking among the largest in the world, occupying 770 acres. Pop. (1901) 30,584.

Creuzer (kroit'sĕr), **George Friedrich,** 1771–1858; German philologist and antiquary; b. Marburg; Prof. of Philology and Ancient History at Heidelberg, 1804, and retained that position for forty-four years; principal work, the "Symbolism and Mythology of Ancient Peoples, especially the Greeks," four volumes, 1810–12. He ascribed to the pagan myths a mystical significance and a supernatural origin.

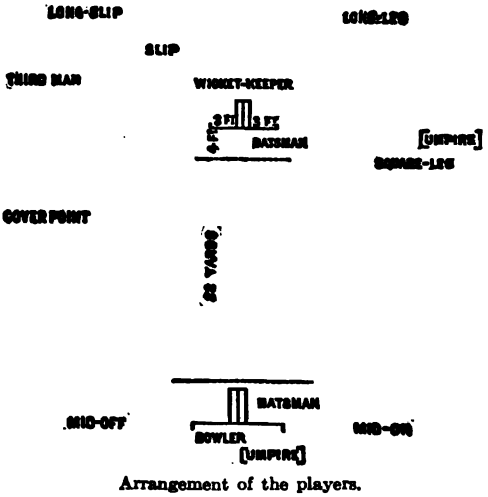
Crib. See FOUNDATION.

Crib'bage, game at cards, usually played by two persons. The game is sixty-one points, scored with pegs on a board called a cribbage board having sixty-one holes on each side. In the U. S. the game, when two or four play, is decided by the winning of two out of three legs. Where three play, the first out in a double circuit of the board is the winner. When cribbage is played by three persons a three-cornered board is used. In this case each player receives five cards, and an extra card is dealt, which is added to the crib. When four persons play each has a partner, and each receives five cards, of which he discards one to form the crib. When only two persons play, six cards are dealt to each player, and each discards two, to form what is called the crib, which belongs to the dealer. The pack is then cut, and the dealer turns up a card, called the turn up, which is reckoned in scoring as belonging to all the hands and the crib. The cards held in the hands are then played alternately, counting the pips or spots (face cards counting ten) up to thirty-one, for which two is scored to the person playing the card that makes the thirty-one, and scoring in the same way for every combination made according to any of the following rules: Any combination of cards the united spots of which make up fifteen scores two points. A sequence in rank (without regard to suit) of three or more cards scores one for each card. Two similar cards of different suits (as two fives or two knaves) form a pair, and score two; three form a pair royal, and four a double pair royal, scoring respectively six and twelve. When the cards are all played each hand is counted by itself, according to the same rules. During the play, when it is found impossible to count to thirty-one without passing that limit, it is called a go, and the last player scores one.

Crichton (krī'tŏn), **James,** 1560–82; called THE ADMIRABLE CRICHTON; b. Perthshire, Scotland; son of Robert, lord advocate of Scotland; educated at St. Andrews, before he was twenty he had run through the entire circle of sciences; could speak in ten languages, and was adroit in all manly accomplishments. He journeyed through Europe abt. 1580, challenging all scholars to a learned disputation in any of twelve tongues; vanquished all the doctors of all the universities; he disarmed the most famous swordsman of the time in fencing, and by his grace and manly beauty his amorous triumphs were not less distinguished. He was killed by his pupil, Vincentio, son of the Duke of Mantua, a dissolute youth whom he had roughly jostled in a carnival encounter.

Crick'et, popular name of certain straight-winged insects, nearly allied to locusts and grasshoppers, the type of the family *Gryllidæ.* The wings, being horizontally folded, form a slender point beyond the wing covers. In virtue of a peculiar formation of the wing covers, and by their friction, the males produce that shrill sound by which these insects are known. Of the typical genus *Gryllus,* the U. S. has several species, including the common black crickets. The house cricket of Europe has become naturalized in the E. U. S., where it is frequently met. See GRASSHOPPER.

CRICKET is also the name of a favorite athletic game in England; also popular in Canada



Arrangement of the players.

CRICKET.

and the U. S. Under the name cricket it dates from 1685; has become the national game of England within a century. The game, played

with bats, wickets, bails, and a ball, needs a level piece of ground, with a close sod. Two wickets are placed 22 yds. apart, each consisting of three stumps or short upright rod of wood, set in the ground at such a distance apart that the ball cannot pass between them, and having across their top two pieces of wood, called bails. Cricket requires eleven players on each side. The game is begun with the outs in the field, and one in at each wicket. The bowler bowls the ball at the opposite wicket, and the batsman endeavors to strike it to such a part of the field as will enable him to make one or more runs from wicket to wicket before the ball is secured by the fielders and returned to the bowler; then the bowler delivers another ball, and so on till he has bowled six, which constitute an "over." The batsman is put out by being caught out, by having the bails knocked off, and in several other ways indicated in the rules. After two innings, the side making most runs is victorious.

Crillon (krē-yōñ'), **Louis des Balbes de Berton de,** 1541–1615; French warrior; b. Provence; served at the siege of Calais, 1558; fought against the Huguenots in the civil wars; distinguished at Jarnac and Moncontour, and at the naval battle of Lepanto, 1571; during reign of Henry III fought against the Catholic League; in 1589 entered the service of Henry IV, who styled him "the bravest of the brave"; contributed to the victory at Ivry, 1590, but after the peace of Savoy retired from public life.

Crime, any act done in violation of those duties which an individual owes to a community, and for a breach of which the law has provided that the offender shall make satisfaction to the public. The ascertainment of these duties, which society imposes upon its members for the general welfare, is derived either from the common concurrence of the moral sentiments of any community or from the enactment of specific laws defining and enforcing particular obligations. Offenses against the one variety of duties are said to be *mala in se* (wrongful in themselves), while those against the other are designated *mala prohibita* (wrongful because prohibited by statute). As a general practice, however, legislative prohibition is also extended to the case of crimes which are strictly *mala in se,* both to provide against uncertainty and fluctuation of opinion and to create additional sanctions; so that the precise original distinction between the two classes is no longer preserved.

By the common law crimes are divided into two great classes—felonies and misdemeanors. The distinction is based upon their relative enormity. "Felony" includes those which are of greatest magnitude, while "misdemeanor" is reserved for the residue. A felony was originally any crime for which the penalty might be a forfeiture of lands or goods; a misdemeanor was one which entailed a milder punishment. In some of the U. S. the punishments distinguishing felonies have been changed, and are now either death or imprisonment in a state prison. In others, while the common-law distinction has been discarded, no different one has been adopted to supply its place, so that the two terms are used without precision or definiteness of meaning. In order that a person may be guilty of a crime there must be a concurrence of capacity, intent, and wrongful act. The principal cause of incapacity are infancy and the want of mental soundness. At the common law a child under seven is conclusively presumed to be unable to commit a crime; between seven and fourteen, his liability depends upon his actual discretion, after fourteen he is considered presumptively capable. Exactly what degree of mental alienation should be sufficient to exempt from responsibility is difficult to determine. The only criterion is the wrongdoer's power of appreciation of the wrongful nature of the act which he committed. Voluntary drunkenness, however, though it may confuse and disorder the moral perceptions, and produce a temporary insanity, affords, in general, no defense for the criminal offender.

The necessity for the existence of a criminal intent in order to make a person responsible for his wrongful acts forms an important distinction between criminal and civil liability, for in civil cases intent need not generally be proved. It has always been a maxim in criminal law that "the act does not make a man guilty unless his purpose also be guilty." The parties engaged in the commission of crimes are distinguished either as principals or accessories. A principal in the first degree is one who is the actual, direct perpetrator of the offense. A principal in the second degree is one who is present, aiding and abetting the act to be done. An accessory is a participant in the wrongdoing in some more remote manner, either by procuration or assistance before the act, or after its occurrence by sharing in the profits acquired or shielding the immediate offenders from justice. In the one case he is called an accessory before the fact; in the other, an accessory after the fact. This distinction between principals and accessories is maintained only with reference to felonies, and even among these an exception is made of the crime of treason. There is no accessory before the fact in the common-law crime of manslaughter, for in it there is no preconceived intent to kill. In treason and in misdemeanors all the participants are deemed principals; in the one case, from the enormity, and in the other from the comparative triviality, of the offense. Accessories after the fact are not so severely punished, as their offense consists in an attack on the administration of justice. A wife is excused for thus shielding her husband.

Crimes are classified by legal writers in different ways. Blackstone treats them as either offenses against morals and religion or the law of nations, or as against the existence of the government or state, such as treason, or against public order under the respective titles of public justice, public peace, public trade, public health or economy, and finally, against individuals. These last are subdivided into those which are committed against the person, against habitations, and against property. But this classification is incomplete. The various

causes are considered under their respective titles. See FELONY; MISDEMEANOR; TORT.

Crime'a, peninsula of S. Russia; part of the government of Taurida, nearly surrounded by the Black Sea and the Sea of Azov; connected with the mainland by the Isthmus of Perekop, 5 m. broad; nearly 200 m. long; area, 9,850 sq. m. The chief towns are Simferopol, Sevastopol, and Baktshi-Serai, the old Tartar capital. It was conquered in the thirteenth century by the Tartars, who converted it into the khanate of Krim-Tartary; annexed to Russia, 1783.

Crimean War, great struggle, so called because chiefly waged in Crimea; carried on by France, Great Britain, Turkey, and Sardinia, against Russia. The aim of the allies was to check the growing power and encroachments of Russia, and to prop up the tottering throne of the Turkish Sultan. One cause of the war was the claim of Russia to be the protector of the Greek Church in Turkey. After ineffectual negotiations between Russia and the Sublime Porte, the Russian army entered the principalities, July, 1853, and war was declared by the sultan in October, 1853. Early in January, 1854, the French and English fleets entered the Black Sea, and these powers announced to the czar that their combined fleets must have command of that sea. A treaty of alliance between France, England, and the Porte having been signed March 12th, the former two powers declared war, March 27th and 28th. The French and English fleets bombarded Odessa, April 22d. Lord Raglan took command of the British army, Marshal Saint-Arnaud of the French, and Prince Mentchik of the Russian. The allies commenced the bombardment of Sevastopol, October 17th, fought a battle at Balaklava, October 25th, and gained a victory at Inkerman, November 5th. The King of Sardinia joined the allies in January, 1855. In May Gen. Pélissier became commander in chief of the French army. On June 18th the allies attacked the important fortresses known as the Malakoff and the Redan, but were repulsed. The French took the Malakoff by storm, September 8, 1855, and the Russians evacuated Sevastopol the same month. An armistice was concluded, February 26, 1856, and a treaty of peace was signed in Paris, March 30, 1856, in which the independence of the Ottoman Empire was guaranteed.

Crinoi'dea, a class of *Echinodermata,* characterized by having a spherical or cup-shaped body, from which radiate five (often branching) arms. The central body is attached to some submarine object either directly or by the intervention of a long, many-jointed stalk. In most genera this attachment continues throughout life, but in the genus *Comatula* the body soon separates from the stalk, and afterwards pursues a free existence. The mouth is in the center of the surface opposite the stalk, and the vent is at one side. In the typical forms ciliated grooves radiate from the mouth and extend along the arms. The cilia in these grooves create currents in the water which bring food to the mouth. The body externally is enveloped in calcareous plates, and the stalk is made up of a series of calcareous disks like button molds movably united one with another. The joints of the stem are extremely abundant as fossils, and in England have the common name of "St. Cuthbert's beads." The Crinoids are divided into three groups—the Crinoids proper, the Blastoidea, and the Cystidea. The Crinoids proper range from the Silurian rocks to the present time. The Blaistoids and Cystideans are all extinct.

Crip'ple Creek, town in El Paso Co., Col.; at the base of Pike's Peak; 30 m. W. by S. of Colorado Springs; owes its existence to the discovery of gold here; founded, 1890; nearly destroyed by fire, 1896; production of Cripple Creek district, 1905, gold, $15,411,764; silver, $29,867; gold production, 1891–1905, $154,331,096. Pop. (1900) 10,147.

Cris'pi, Francesco, 1819–1901; Italian statesman; b. Ribera, Sicily; became a lawyer in Naples; was one of the leaders of the insurrection in Palermo, 1848, and for two years prominent among the Sicilians in their resistance to Ferdinand I; in 1859 and 1860 was again at the head of a revolution of Sicily, and coöperated with Garibaldi in the expulsion of the Bourbons, which brought about the annexation of Naples and Sicily to the Kingdom of Italy; elected to Parliament, 1861; leader of the Constitutional Left; president of the Chamber of Deputies, 1876; Minister of the Interior, 1877–78 and 1887; president of the Council, 1887–91 and 1894–96; a firm supporter of the triple alliance of Italy, Germany, and Austria.

Cris'pin, Saint, d. 287 A.D.; native of Rome; worked as a shoemaker in Gaul; with his brother suffered martrydom by being thrown into a caldron of molten lead; both are commemorated, October 25th; patron saint of shoemakers.

Critola'us, Greek philosopher; b. Phaselis, in Lycia; was the head of the Peripatetic school in Athens; eminent as an orator as well as a philosopher; sent to Rome on an important embassy with Carneades abt. 155 B.C.

Crit'tenden, John Jordan, 1787–1863; American statesman; b. Woodford Co., Ky.; Attorney-General Illinois Territory, 1809; served in War of 1812; member Kentucky legislature several terms; U. S. Senator, 1817–19, 1835–41, 1842-48, 1855-61; U. S. Attorney-General 1841, 1850–53; Unionist member of Congress, 1861–63; opposed secession; author of "Crittenden Compromise" resolutions, rejected in Senate; denounced the Conscription Bill; was noted for his eloquence.

Crittenden Com'promise, in U. S. history, a series of amendments to the U. S. Constitution proposed in 1860 by Senator J. J. Crittenden to prevent secession. Slavery was to be protected S. of 36° 30′, and prohibited in territory N. of that line; Congress was not to abolish slavery in any slave state, nor in the District of Columbia while Virginia and Maryland were slave states; Congress was not to hinder the legal transportation of slaves from one state to another; slave owners were to be compensated for fugitive slaves who were rescued, and

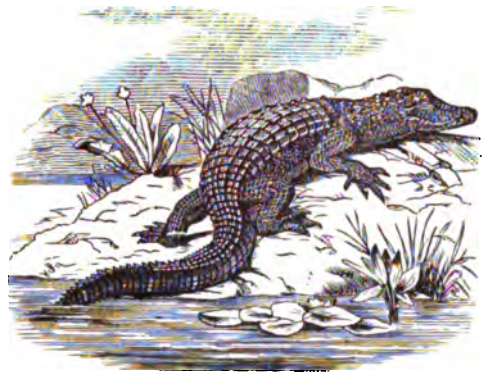
Congress was to aid the return of the fugitives. The proposition was defeated in a Senate committee, May 2, 1861, and was not considered by the House.

Croatia (krō-ā'shē-ä), province of the Austro-Hungarian monarchy; bounded on the NW. by Carniola and Styria, on the W. by the Adriatic, on the NE. by Hungary, and on the S. by Bosnia, Servia, and Dalmatia. Various outrunners of the Alps, comprised under the name of "the Julian Alps," traverse the country in its whole length, and divide it into two sections, one belonging to the Danube basin watered by the Save and the Drave, and the other forming part of the highlands of the Adriatic coast. Large crops of wheat, oats, rye, potatoes, flax, and hemp are raised; tobacco is extensively cultivated; and an excellent wine is produced, though the national beverage, like that of Hungary, is made from the plum. Horses, swine (feeding in the forests), and bees are kept in great numbers. The manufacturing industry of the country is very small, consisting chiefly of a few silk-spinning factories, glass works, and distilleries. Grain, wine, chestnuts, honey, and horses are exported. Of the inhabitants, about ninety per cent are Croats and Servians; the remainder are Germans, Magyars, Israelites, Italians, and Albanians; about seventy-one per cent are Roman Catholics, twenty per cent belong to the Oriental Greek Church; the remainder are Protestants and Jews. This region was anciently inhabited by the Pannonians, who were conquered by the Romans in the reign of Augustus. In 640 A.D. the Croatians, or Horvats, migrated from the Carpathian Mountains to this country, and gave it the name of Croatia. For several centuries Croatia was independent; 1097 it was conquered by the King of Hungary. This province, with Slavonia and their former "military frontier," now forms a division of the Hungarian kingdom (Transleithania); united area, 16,423 sq. m.; pop. (1900), 2,400,766; capital, Agram.

Crocidolite (krō-sĭd'ō-līt), variety of quartz, the finest being found in Griqualand, S. Africa, which incloses parallel-colored fibers, probably of asbestos. Its color varies—yellow, brown, blue, light green, and red being the more usual. It is known as tiger-eye, and is used in making ornaments, such as umbrella handles. The finest comes from Griqualand, S. Africa, but specimens are also found in the U. S. in NE. Pennsylvania, New York, and Rhode Island, though these are valueless for ornamental purposes.

Crock'ett, David, 1786–1836; American pioneer; b. Limestone, Tenn.; became a hunter; served in the Creek War; member state legislature three terms; of Congress, 1827–31, 1833–35; joined the Texan revolutionists; was one of six surviving defenders of Fort Alamo who were put to death after surrendering; noted for eccentricity in manner and language.

Croc'odile, reptile of the genus *Crocodilus*, which comprises the true crocodiles as distinguished from the alligators, caymans, and gavials. *Crocodilus* is the typical genus of the order *Crocodilia*, a group of reptiles characterized by an elongated body, short, stout limbs, and massive skull. Living *Crocodilia* are divided into three families: (1) *Gavialidæ*, containing the gavial of India and tomistoma of Borneo. (2) *Crocodilidæ*, the true crocodiles, with rather long muzzle, hind legs deeply fringed, toes much webbed. (3) *Alligatoridæ*, alligators and caymans, characterized by a broad muzzle, toes slightly webbed, no fringe on hind



NILOTIC CROCODILE.

legs. The crocodile of the Nile, revered by the ancient Egyptians and mummied when dead, is now so persecuted by tourists that it has almost disappeared below the First Cataract, and has in other places become exceedingly wary. It is, however, still widely distributed in Africa, and in some localities is so dangerous that the natives are obliged to build inclosures of stout posts, reaching into the rivers, in order to draw water with safety. The true crocodiles have their habitat in S. Asia, and have a preference for slow-running or still waters, where they feed upon fish and the partly decomposed bodies of animals they may capture or find dead. The salt-water crocodile of the E. Indies reaches a great size, and is dreaded for its man-eating propensities.

Cro'cus, large genus of plants (herbs) of the *iris* family, natives of Asia and Europe. The *Crocus vernus* and other species afford many varieties of very early spring flowers, common in cultivation. *C. sativus* and other species blossom in autumn. The autumn crocuses are rarely cultivated in the U. S. Their orange-red stigmas, when dried, constitute the drug known as Saffron.

Crocus of Mars, finely divided red oxide of iron used in medicine and the arts. The "crocus of antimony" of the old chemists was a mixture of the trisulphide and trioxide of antimony. The "crocuses" received their name from their saffron color.

Crœsus (krē'sŭs), b. abt. 590 B.C.; King of Lydia, proverbial for his riches; succeeded his father, Alyattes, 560, and soon extended his dominions by the conquest of the Æolians, Ionians, and other peoples of Asia Minor; is said to have enriched himself by the golden sand of the rivulet Pactolus. In 546 B.C. he was

defeated in battle and taken prisoner by Cyrus of Persia, who devoted him, with fourteen Lydian youths, to the flames as a thanksgiving sacrifice to the god the Persians worshiped under the aspect of the fire. Crœsus was saved, however, and afterwards lived in honor at the court of Cyrus as his trusted adviser.

Croft'er, in Scotland, a tenant who lives on a holding the annual rent of which does not exceed £30. The term commonly designates a small tenant who lives mainly by farming or the raising of live stock. There are two classes—those who occupy land in separate tenancy only, and those who occupy tillable land in separate tenancy and hold mountain pastures in joint tenancy. The first class are sometimes called "independent" crofters and the second "township" crofters. The latter are so much the more numerous that joint tenancy of pasture is the characteristic feature of crofting life. They are found in the lower parts of the W. Highlands and islands, Sutherland, Caithness, Orkney, Shetland, and in parts of Ross-shire and Inverness-shire, and less frequently on the E. seaboard.

Croker (krō'kėr), **Thomas Crofton**, 1798-1854; Irish antiquary; b. Cork; published "Researches in the South of Ireland," "Fairy Legends and Traditions of the South of Ireland," "Legends of the Lakes," and an edition of "Popular Songs of Ireland."

Cro'mer, Evelyn Baring (Earl), 1841– ; British statesman; b. Cromer Hall, Norfolk; son of Henry Baring, member of Parliament; served in the Royal Artillery; secretary to his cousin, the Earl of Northbrook, Viceroy of India, 1872–76; Commissioner Egyptian Public Debt, 1877–79; Controller General in Egypt, 1879; financial member of Council of Governor General of Egypt, 1880; agent and Consul General in Egypt, 1883–1907; reduced the taxation of the fellahin (the Egyptian peasantry); established a model system of irrigation; administered justice according to a regular code; abolished forced labor; made the rights of property recognized by law; earned the popular title of "Maker of Egypt"; created baron, 1892; viscount, 1898; earl, 1901.

Cromlech (krŏm'lĕk), circle of upright stones, erected by some forgotten race, such as are



KIT'S COTY HOUSE. A TYPICAL CROMLECH.

found in Brittany, Great Britain, Ireland, and Scandinavia. Formerly applied by British archæologists to equally ancient structures consisting of two or more unhewn stones fixed vertically in the ground and supporting a large flat stone. These now bear the separate name of dolmen (*q.v.*), and are believed to be uncovered chambered cairns.

Cromp'ton, Samuel, 1753–1827; inventor of the spinning mule; b. near Bolton, England; for his invention, perfected, 1779, he received, in subscriptions from the manufacturers, only £67 6*s.* 6*d.* His means were so limited that he could not go to the expense of taking out a patent, and so was glad to make private arrangements for the use of his invention. Meanwhile, the mule spread so rapidly, and its influence was so palpable, that, 1812, he drew up a petition to Parliament for a public reward. Parliament voted him £5,000. He was a shy, sensitive, studious man, fond of mathematics and of music.

Crom'well, Oliver, 1599–1658; Lord Protector of England; b. Huntingdon; elected to Parliament, 1628, and to the Short and Long Parliaments, 1640; entered the army of Parliament as commander of a regiment raised by him, composed chiefly of Independents and known as the "Ironsides"; on reorganization of army became lieutenant general; in command of the right wing at Naseby, 1845, and greatly contributed to that victory; aided the Independents in obtaining control of Parliament; defeated the Scottish royalists at Preston, 1648; was a member of the court which tried and sentenced Charles I, 1649; became a member of the new Council of State, 1649, and virtually controlled the government. As Lord Lieutenant of Ireland he subdued the rebellious Irish loyalists with cruelty; was appointed commander in chief of the Commonwealth forces, 1650; defeated the Scottish army at Dunbar and Worcester; dissolved the remnant of the "Rump," or Long Parliament, 1653, and summoned a new one; assumed title of Lord Protector of the Commonwealth, 1653. His domestic policy was favorable to religious liberty and conducive to the prosperity of the country; his foreign policy was dignified and enlightened, securing for England a more commanding position than she had previously occupied; waged successful wars with the Netherlands, Spain, Algiers, Tunis, and Tripoli; declined the title of king offered by Parliament. At his death his son Richard succeeded to the protectorship. His body was disinterred and gibbeted after the Restoration and then buried under the gallows, his head being placed on Westminster Hall.

Cromwell, Richard, 1626–1712; Lord Protector of England; b. Huntingdon; third son of Oliver Cromwell; entered Lincoln's Inn as a student of law, 1647; a man of moderate capacity, virtuous and unambitious. After his father became protector, Richard was elected to Parliament; was a member of the Privy Council; succeeded his father as protector, 1658, but the army was disaffected, and he was not earnestly supported by the people; resigned, 1659, and passed the rest of his life in obscurity, spending about twenty years on the Continent.

Cronje (krŏn'yĕ), **Piet**, 1837– ; Boer military officer; b. Orange Free State; served twenty years on the executive staff of the Transvaal Republic; precipitated the war of 1881; captured the Jameson raiders at Krugersdorp, 1895; at beginning of war of 1899–1900 was placed in command of the Orange Free State forces; directed the sieges of Mafeking and Kimberley; made a heroic ten-days' defense at Paardeberg; was surrounded by the vastly superior force of Lord Roberts while retreating, and surrendered with 3,000 of his men. He was deported to St. Helena; later released; and with a picked force of his army associates gave representations of the Boer War at the St. Louis Exposition, 1904.

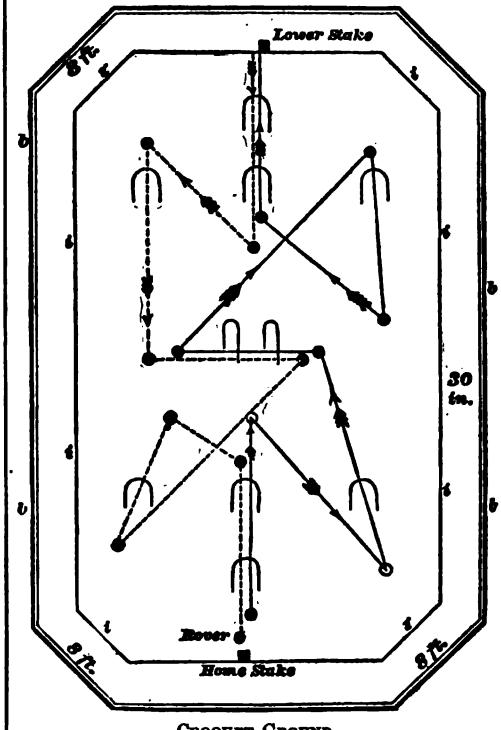
Cro'nos, god of Greek mythology; son of Uranus, and father of Jupiter, Neptune, Juno, and Ceres; is commonly identified with the Roman Saturn (*q.v.*).

Cron'stadt, fortified seaport of Russia; on the island of Kotlin, in the Gulf of Finland; 20 m. W. of St. Petersburg, and opposite the mouth of the Neva; an important commercial town, the greatest naval station of Russia; two thirds of the foreign commerce of Russia passes through Cronstadt, which has three harbors. The inner harbor is used for merchant vessels, and has a capacity for 1,000 vessels. A ship canal extends from Cronstadt to St. Petersburg. It is 6 m. long and navigable for vessels drawing 20½ ft. of water. Ice renders this port inaccessible nearly five months in the year. Pop. (1897) 59,539.

Crookes, Sir William, 1832– ; English physicist; b. London; founded the *Chemical News*, 1859; editor of the *Journal of Science*, 1864; discovered thallium, 1861; has made numerous discoveries in chemistry and physics; invented the radiometer, 1875, and the otheoscope, 1877; announced his discovery of the fourth or ultra-gaseous state of matter, 1879; awarded special gold medal by the Academy of Science in Paris, 1880; author of several handbooks and contributions to scientific journals. In 1883 he discovered some remarkable phenomena obtained by sending the electric discharge through glass tubes in which a very high vacuum had been produced. Hertz subsequently showed that certain of the rays emanating from such tubes were capable of penetrating metals and other opaque bodies. In 1896, Röntgen utilized the property in photographing hidden objects.

Croquet (krō-kā'), outdoor game much resembling pall mall, which was popular in Europe in the sixteenth and seventeenth centuries; croquet proper is comparatively modern. When first introduced into the U. S. it was considered a simple game, almost devoid of opportunities for the display of skill. With the development of the game ways of accurate and skillful playing have been introduced, and the materials improved, until, as played by experts, the game is claimed to be as scientific as billiards.

According to the rules adopted by the National American Croquet Association, the ground when full sized should measure 36 by 72 ft., and be raised 2 in. at the border, the slope extending 30 in. into the field, as far as *i i i*, imaginary lines denoting the boundary of the field. The stakes or posts to be 1 in. in diameter and 1½ ft. high, situated at the base of the rise at the center of the width of the field. The first wicket to be 7 ft. from the stake; the second, 7 ft. from the first, on a line extending through the middle of the field; the side arches to be 5 ft. from the foot of the rise, on a line with the second arch from each stake; the cage or double wicket in the center to be 18 in. long and 3½ in. between the wires, and set at right angles with a line drawn from stake to stake. The border *b b b*, at the top of the slope, to be made of maple or other hard wood, about 4 by 6 in., laid flat to serve as a cushion whence caroms can be made; the corner pieces to be of same material and 8 ft. long, inside measure. All arches, except the center arch, to be 3½ in. in the clear.



CROQUET GROUND.

Many clubs still adhere to the old rectangular form, without any slope inside the border to bring the balls into the field, and with the wickets all made in the direction in which the player is going. In less scientific games the cage in the center is replaced by a single arch, which is made the same as the other arches. In the ordinary croquet set the wickets are very much wider than stated above. The game was originally and is still commonly played as a lawn game. Much more scientific play can, however, be made on a ground of well-rolled dirt, lightly sanded to hold the

balls. All national match games must be played on dirt ground. The mallets should be of boxwood, 7 or 7½ in. long by 2¼ to 2½ in diameter, and the handle from 8 to 30 in. long, to suit the player. The best balls are of hard rubber, 3¼ in. in diameter. Balls of boxwood and other hard wood are commonly used.

The game is played by from two to eight players. The object is to make the player's ball pass in succession through all the wickets, striking the lower or turning stake and the home stake, all in the order and direction indicated in the diagram. In this journey, however, the player's ball may be aided by friends or retarded by enemies. The chief points of excellency are: 1, accuracy in roqueting, for which an accurate eye and trained hand are indispensable; 2, ability to secure position in front of arches; 3, skill in wiring an adversary's ball; 4, good generalship. Important points to be observed are: keeping your own balls together and separating those of your adversary; keeping the innocent ball of your adversary with you or your partner, and the guilty adversary ball wired; giving your partner a set up when you can make no further run; and, in making a run, providing for points ahead and leaving no balls behind. Numerous treatises with the rules of play have been published.

Crosier (krō'zhėr), or **Cro'zier, staff** curved at the top in imitation of a shepherd's crook (and pointed at the lower end), given to a Roman Catholic bishop at his consecration, and used by him as the symbol of the authority with which he rules his flock; also used by cardinals, by some canons of cathedral churches, and by abbots.



CROSIER OF THE THIRTEENTH CENTURY.

Cross, instrument anciently used for inflicting the punishment of death, especially upon slaves and the vilest malefactors, and after the crucifixion of Christ the principal Christian symbol. As an instrument of death the cross occurred in two forms—either as a plain vertical stake, to which the convict was nailed with the hands above the head, or as a vertical stake provided with a crossbar at the top, to which the convict was fastened in the same way, only with the arms outstretched. As a symbol the cross occurs under many different forms; the *crux immissa* or *crux ordinaria* (✝), the Latin cross or cross of the Romans, on which Christ suffered; the *crux decussata* (X), the Burgundian cross, also called the cross of St. Andrew, because the Apostle Andrew is said to have suffered martyrdom on it; the *crux commissa* (T), the Greek cross, on which the Apostle Philip is said to have suffered death, also called St. Anthony's cross or the Egyptian cross, because by that St. Anthony is said to have destroyed the idols of Egypt; the cross of four equal arms meeting at right angles (✚), used as the symbol of the Red Cross associations and ambulance services; finally, the double cross (✙) and the triple cross, the first used by the pope, the second by the Raskolniks, or Russian sectaries. See CRUCIFIX.

Cross, Mary Ann. See ELIOT, GEORGE.

Cross'bow. See BOW AND ARROW.

Cross Examina'tion, in law, examination of a witness by a party against whom he is called to testify, and thus distinguished from a direct examination, which is had by the party calling the witness. The range of a cross examination is much wider than that of a direct examination, the party examining being allowed to impeach the credit of the witness and to show the inconsistency of his statements, his bias, his want of memory, and other matters tending to reduce the value of his testimony.

Cross Fertiliza'tion, the fertilization of the ovules (female elements) of plants with pollen (male elements) from a different plant. There is a great difference between orders, genera, and species of plants in their capability of cross fertilization. Darwin's demonstration of crosses between species, and even genera, of plants upset the old theory of the permanency of species. Characters of the male or of the female parent may predominate in various proportions in the cross, or sometimes there is a reversion to a common ancestral type. It has been found that some varieties of plums, pears, apples, grapes, olives, raspberries, and gooseberries are sterile unless fertilized by the pollen of other varieties. Species of the mint, convolvulus, and phlox families will not mingle. On the other hand, the rose family shows great aptitude for cross fertilization.

Cross fertilization takes place occasionally in nature through the medium of the wind or pollen-carrying insects. Transition types which botanists hesitate to class as distinct species may have originated in that way. Gardeners do it for the definite purpose of modifying, improving, or suppressing certain characters of cultivated plants, some of which have been from the beginning a hybrid strain. Artificial

cross pollination is done by conveying the pollen of one parent plant to the stigma of the other, the flower to be fertilized being usually enclosed after the stamens have been removed, to guard against natural pollination. A natural law of heredity governing cross fertilization was discovered by Mendel, an Austrian monk, who experimented with pea varieties at Brünn. The principle which he enunciated in 1866 has been developed by de Vries, Correns, Tschermak, and Webber. Mendel took pairs of opposite characters and found that half the offspring were hybrids in respect to these characters and half were identical with the parents in equal proportions. The hybrids when self-fertilized showed the same proportions, one half in an equal division returning to the parent types. Mutations, or distinctive characters belonging to neither parent, are exceptional, and when they occur they often appear to be derived from remote progenitors. Upon these infrequent variations depends largely the usefulness of cross fertilization in producing valuable new varieties. Results of cross fertilization are the development of new varieties, not hybrids alone that combine qualities of the parents, but of so-called sports, which are more frequent in hybrids than in pure races; greater resistance to heat, cold, drought, or disease; increased vigor, size, and production of edible fruits or roots; earlier maturity; improved flavor in fruits and odor, coloration, and doubling of flowers. The citrange, a hardy orange, has been produced by crossing the trifoliate species with the sweet orange. The tangelo is a hybrid of the pomelo with the tangerine. The English walnut has been crossed with the California black walnut and the latter with the E. black walnut. The plumcot is a cross of plum and apricot. See REPRODUCTION.

Cross Keys, locality in Rockingham Co., Va., near the forks of the Shenandoah, where a battle was fought, June 8, 1862, between 8,000 Confederates under Ewell and 18,000 Federals under Fremont. Ewell held his ground all day, and at night moved on to join Jackson, who was confronting Shields at Port Republic, not far distant. The Confederate loss at Cross Keys and Port Republic was 133 killed and 929 wounded; the Union loss was about the same.

Cross, The South'ern. See SOUTHERN CROSS.

Crot'alus. See RATTLESNAKE.

Cro'ton Aq'ueduct. See AQUEDUCT.

Croto'na, or Cro'ton, ancient Greek city of Italy, in the Bruttian peninsula and on the Mediterranean Sea; founded, 710 B.C.; became populous and important. The Crotonians worshiped Hercules, were noted for their devotion to athletic sports, and, led by the famous athlete Milo, in 510 B.C. conquered Sybaris and leveled it with the ground. The decline of Crotona began with the arrival of Pythagoras. The city was originally governed by a council of 1,000—men who descended from its Achæan founders—but 300 disciples of Pythagoras once succeeded in overawing the council and seizing the supreme authority. They were soon expelled and a democratic government established, but from that time stability of government was lost. The Crotonians were defeated by the Locrians abt. 480 B.C., and later were tributary to Syracuse. During the second Punic War, Hannibal made Crotona his winter quarters, which completed the ruin of the city. A Roman colony was established here abt. 480 B.C. Its site is now occupied by Cotrone. Pop. (1901) 7,902.

Cro'ton Bug. See COCKROACH.

Croton Oil, expressed oil of the seeds of *Croton tiglium,* a small tree which grows in Hindustan, Ceylon, and other parts of Asia. It is a powerful purgative, valuable because it



CROTON TIGLIUM.

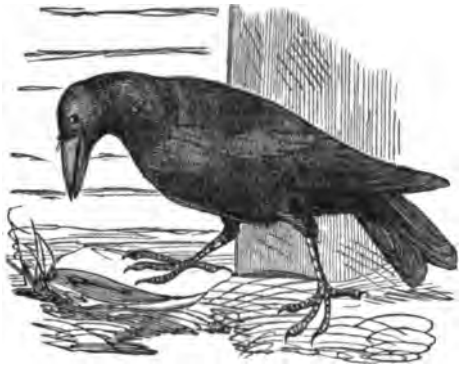
can be employed in minute portions. Great care must be used in its administration. It is applied externally as a counter irritant, and to produce blisters, and is useful to relieve brain congestion, especially in cases of apoplexy.

Croup, name popularly applied to two diseases of different origin and severity, but both causing difficult breathing by obstruction of the larynx.

Spasmodic croup, due to spasm of the larynx usually occurs in children from two to five. The child goes to bed well, but awakens with hard breathing and a harsh cough. Its face may become blue with congestion. The attack passes suddenly, and next day the child is well, though there may be attacks on several successive nights. The child may be placed in a hot bath, or given an emetic, especially if its stomach is overloaded; or a whiff of chloroform will relieve the spasm. For the severer disease, membranous croup, see DIPHTHERIA.

Crow, common name of several varieties of birds of the genus *Corvus,* which includes ravens, rooks, daws, and other species. They are characterized by a comparatively short tail, long wings, strong, rather conical beak, and generally uniform glossy black plumage. Crows are distinguished from ravens by their

smaller size, and by the feathers of the neck blending with those of the body. The crows, as popularly understood, are mainly inhabitants of the temperate zone. They are intelligent, wary birds (when persecuted), and are omniverous, feeding upon fish, flesh and fowl, eggs, snakes, frogs, crabs, shellfish, grubs,



American Crow.

fruits, seeds, and berries. The common crow of N. America is particularly abundant in the E. U. S., and is generally looked upon as the inveterate foe of the farmer from the injury it inflicts on growing crops, and especially on corn. In the fall and winter crows assemble by thousands in great roosts, or rookeries; one of these roosts, on the Potomac, above Washington, has been estimated to contain 40,000 crows, while others are still larger.

Crown, decorative wreath, ring, or cap, worn on the head, either for ornament at times of festivity, or as an honorary badge, or as a mark and symbol of high rank—especially, in modern times, the mark of sovereignty. Crowns of olive, laurel, etc., and wreaths of various flowers were freely used by the Greeks at feasts and ceremonies, and as prizes in athletic and other contests, each plant when so used having its special significance; and similar wreaths and garlands were made of gold



Crowns.

and other metals in imitation of natural foliage. The Romans followed the Greeks in the use of such wreaths. One such was granted to a general who had caused the siege of a town to be raised; it was made of plants which grew within the place. In like manner the civic crown was given to one who in battle had saved the life of a citizen, and the naval crown to a victor in naval warfare. The civic crown was a garland of oak leaves and acorns; the naval crown was called *corona rostrata,* because adorned with figures of ships' beaks (*rostrum,* beak). A corpse was crowned on the occasion of funeral rites, and both bride and groom at a marriage ceremony.

It is probable that no kind of crown was assumed by any emperor during his lifetime before the time of Constantine. In the Middle Ages crowns were of many forms. It came gradually to be considered that a mere ring around the head, even if adorned with spikes or flower-like ornaments on the top, was of lower dignity, and that the crown of a sovereign prince should be closed at top, or should have arches over the head from side to side. The modern crown of the sovereigns of England has four half arches, inclosing a velvet cap to cover the head. Crowns of nobles not sovereign princes are generally called coronets. The distinguishing feature of what is called the *imperial* crown is the ball surmounted by a cross. This feature is common in all countries, but other details are subject to variation.

Crown and **Half Crown,** originally English gold coins issued by Henry VIII, 1527. The first commission for coining them of silver was signed by Edward VI, October 1, 1551. The crown is a silver coin worth five shillings sterling, or about $1.25 in U. S. money.

Crown Glass, glass usually employed for windows; made of 100 parts of sand, 35 of soda ash or potash, and 35 of chalk; essentially a silicate of soda (or of potash) and lime.

Crown Point, town of Essex Co., N. Y.; first settled by the French, who in 1731 built Fort St. Frederick (the "Crown Point" of history) on a long cape projecting into Lake Champlain. In 1775 it was surprised and taken by the Americans under Seth Warner. The British fort at Crown Point, which cost nearly $10,000,000, is now in a ruinous condition. Pop. (1900) 2,212.

Crown Prince, in several European countries, the title of the heir apparent to the throne.

Crown, Trea'ty of the, treaty made at Vienna, November 16, 1700, in which Emperor Leopold recognized Elector Frederick III, of Brandenburg, as King of Prussia. Frederick engaged to furnish 10,000 men to support Austria in the Diet, and to vote as elector for the descendants of the emperor's son, Joseph, King of the Romans.

Crows, tribe of N. American Indians, of the Siouan family; dwelling at different periods on the Missouri, Big Horn, Yellowstone, and Platte rivers; now occupying a reservation in Montana; numbering about 2,000. They have been officially classed as Mountain Crows and River Crows; formerly considered the proudest of Indians, extremely superstitious, and skillful horsemen; and for many years were at war with surrounding tribes, especially the Siksikas and Dakotas.

Crozet (krō-zā') **Is'lands,** in the Indian Ocean; 1,400 m. S. of Madagascar; area, 200 sq. m.; called Inaccessible, Possession, East, Apostle, and Pig islands; discovered, 1772, by Capt. Marion; though high, volcanic islands, they

are seldom visible on account of the fog that prevails most of the year, and are therefore dangerous to navigation. They are not inhabited.

Cru'cible, vessel used by chemists in melting minerals, metals, etc.; made of clay, porcelain, and other substances capable of resisting extreme heat. Platinum crucibles are especially useful.

Cru'cifers, the mustard family, dicotyledonous; many species; herbs, rarely shrubs. They inhabit all countries, and are especially abundant in S. Europe and Asia Minor. The parts of the flowers are all separate, except the two carpels which form a compound pistil. There are normally four sepals, four petals, six stamens. The name crucifer alludes to the cross-like form of the flower. Many species possess a pungent volatile oil, especially the mustard. A few yield food, as the turnip, cabbage, cauliflower, radish, etc.

Cru'cifix, cross with an image of Christ on it, carved or painted; found in use in all branches of the Church Catholic, except Calvinistic Protestantism. No crucifix is found in the catacombs nor is there any definite reference to one earlier than the fifth century. On the earliest crucifixes Christ was shown clothed and alive, but about the tenth century the naked Christ, with a loin cloth and pierced by nails, took its place. From the thirteenth century the feet were crossed and pierced by one nail. See CROSS.

Crucifix'ion, form of capital punishment common among almost all ancient nations, but not used by the Jews until their later history, when they borrowed it probably from the Romans. It consisted in nailing or binding the criminal, perfectly nude, to a crosspiece (it was this rather than the upright which the criminal was required to carry) and then raising him, thus hanging, from the ground a foot or two and fastening the crosspiece upon the upright stake, where he was left until dead from hunger or exhaustion. Its invention is ascribed to Semiramis. It was abolished by Constantine the Great abt. 315 A.D.

Cruikshank (krŏk'shănk), **George,** 1792–1878; English caricaturist; b. London; began to publish his work when only twelve years old; until he was nearly eighty produced etchings and woodcuts incessantly. His attacks on the prince regent, afterwards King George IV, and the queen, were unmeasured and ferocious. From abt. 1823 on, his more important work was book illustration: Grimm's "German Popular Stories," "The Novelists' Library," with illustrations to "Tom Jones," "Roderick Random," "The Vicar of Wakefield," "Oliver Twist," etc.; "The Comic Almanack," 1835–53; "Rookwood," "Jack Shepard," and other novels of W. H. Ainsworth; "The Ingoldsby Legends," "George Cruikshank's Fairy Library," etc. One of the best things of his later work is the "Life of Sir John Falstaff" in large etchings.

Crusades', expeditions by which the Christian nations of Europe, in the eleventh, twelfth, and thirteenth centuries sought to recover Palestine from the Mussulmans. Previous to the setting out of the true crusaders, unorganized armies of Christians had at various times made the attempt, one of which, of 40,000 men, women, and children, under Peter the Hermit, 1096, was routed by the Turks, while another of 200,000 was cut to pieces. Roused by the preaching of Peter six armies, aggregating 600,000 warriors, under Godfrey of Bouillon, set forth for Constantinople, 1095; crossed into Syria; took Antioch after a seven months' siege; with a force reduced to 40,000 took Jerusalem, 1099; and elected Godfrey King of Jerusalem. The three Latin principalities of the East (Edessa, Antioch, and Jerusalem) maintained themselves against the attacks of the Mohammedans till 1144, when the Emir of Mosul conquered Edessa and massacred its Christian inhabitants. His son, Noor-ed-Deen, marched on Syria and Palestine.



A CRUSADER.

A second crusade was preached by St. Bernard, Abbot of Clairvaux, and in 1147 two armies, numbering together 1,200,000 men, set out for Jerusalem. They were commanded by Louis VII, King of France, and Conrad III, Emperor of Germany. This expedition utterly failed through the treachery of the Greek Emperor, Manuel Comnenus, and neither army ever saw the Holy Land.

In 1187 Saladin, Sultan of Egypt, invaded Palestine, and took Jerusalem. This event gave rise to a third crusade, under the leadership of Frederick Barbarossa, Emperor of Germany; Philippe Auguste, King of France, and Richard Cœur de Lion, King of England. The crusaders, though not united in motive, gained some important victories, and the crusade was closed by a treaty in which Saladin agreed to lay no taxes on Christian pilgrims to Jerusalem.

In 1195 Henry VI of Germany undertook a crusade, but his death caused the project to be abandoned.

A fourth crusade, instituted by Pope Innocent III, 1203, turned from its course to take possession of the Byzantine Empire, and never reached Palestine.

In 1228 Frederick II of Germany commanded a fifth crusade, by which he became master of Palestine and was crowned King of Jerusalem.

In 1239 the Turks having again seized Jerusalem, a sixth crusade was undertaken under Thibaud, Count of Champagne. A nominal surrender of the Holy Land was the result.

In 1244 Jerusalem was burned and pillaged by a new race of Turks.

A seventh crusade, headed by Louis IX (St. Louis) of France, set out 1249. It was badly defeated by the Sultan of Egypt, who also made a prisoner of the king. Louis obtained his freedom by the payment of a large ransom.

The eighth and last crusade was also undertaken by St. Louis, 1270. The king died at Carthage of the plague, and Prince Edward, afterwards Edward I of England, assumed command. The expedition accomplished nothing of importance, and in July, 1272, Edward returned to England with the last of the crusaders.

The chief result of the crusades was a better acquaintance of the people of W. Europe with two civilizations more advanced than their own—the Greek and the Saracenic. Thus a powerful impulse was given both to the literature and the commerce of Europe. See CHILDREN'S CRUSADE.

Crush'ing Machin'ery. See GRINDING AND CRUSHING MACHINERY.

Crusta'cea, the highest group of jointed animals (see ARTHROPODA), of which crabs, lobsters, shrimps, sow bugs, beach fleas, barnacles, etc., are familiar examples. They are like all arthropods in having a jointed body with external skeleton, each joint bearing a pair of jointed appendages. Each joint or segment of the body is like its fellows in its broader features, but the segments are variously modified in the different regions of the body. Thus the two front segments are always very small, and the appendages are modified into "feelers" or antennæ. Behind these come several appendages adapted for eating, and still farther back are the true limbs for locomotion. The mouth is below, just behind the antennæ; the "stomach" is frequently modified for chewing the food (the "lady" in the lobster); just behind the stomach the "liver" pours in its secretions, the intestine is straight. The nervous system consists of a brain in front of the mouth, and a chain of secondary nervous centers, lying along the floor of the body. The heart is on the back. Arteries and veins are developed, but there is no capillary system, the blood flowing in the spaces between the muscles. Breathing is effected, in the smaller forms, by the general surface of the body, in the larger by gills which occur on the legs. In the palm crab of the tropics an apparatus simulating a lung has been developed. In all excepting the barnacles the sexes are separate.

The crustacea usually carry the eggs about with them until the time of hatching. The eggs are usually filled with yolk, and in all cases pass through a stage with a single eye, without body segments and with but three pairs of appendages. This is called the *nauplius* stage. About 10,000 species of crustacea have been described, most of them from the sea, a few from fresh water, still fewer being terrestrial.

Crutch'ed Fri'ars, English friars who appeared in the thirteenth century, and had monasteries in London, Oxford, and Reigate. From the staff which they carried in their hand, on the top of which was a cross, they received the name *croisiers,* which soon was corrupted into "crouched" or "crutched" friars. A street in London bears this name.

Cry'olite (Greek "frost stone"), mineral so named from its fusibility in the flame of a candle; a compound of sodium, fluorine, and aluminum, used for the preparation of aluminum. Large quantities are exported from Greenland, and it is employed in the U. S. in making a white porcelain glass, and in making caustic soda.

Cryoph'orus, an instrument invented by Wollaston to freeze water by the absorption of heat arising from its own evaporation. It consists of a glass tube with a bulb at each end. One bulb contains water. A vacuum is produced in the tube and opposite bulb, and the empty bulb being placed in a freezing mixture, the vapor arising from the water is condensed, so that the water soon congeals in the other bulb, though the intervening tube be 2 or 3 ft. long.

Crypt, a vault under a church used either for a sepulture or, rarely, as a chapel. Crypts were not common after the early Romanesque or Norman period, and where they exist under churches of a later date they are usually much older than the church. They seem to have been designed to receive the bodies of saints, martyrs, and Church dignitaries, and are in many cases beautifully though simply finished structures. One of the finest examples is that under Glasgow Cathedral. There is a vast crypt under St. Peter's at Rome. See VAULT.

Cryp'to Cal'vinists, name applied in the last half of the sixteenth century to the followers of Melanchthon (called also Philippists), who desired the union of the Lutherans and Calvinists, and were charged with leaning too strongly toward the Calvinistic doctrine of the Lord's Supper; also applied to the Missouri Lutherans, because they defend the doctrine of unconditional election as taught in the "Formula of Concord."

Cryptog'amous Plants, or **Crypt'ogams,** all plants below the Phanerogams, or flowering plants. The names were first used by Linnæus, who may have thus indicated his conviction that all plants possess sexuality. (They do not.) For a long time the vegetable kingdom was divided into two groups: 1. *Phanerogamia,* with stamens, ovules, seeds, and embryos. 2. *Cryptogamia,* without stamens, ovules, seeds, and embryos, and with spores. These distinctions, although unscientific, are still maintained, especially in popular usage. The Cryptogams, instead of being a single group coordinate with the Phanegams, include several such groups—*e.g.*: I. Water slimes (*Protophytes*); II. Spore tangles (*Phycophytes*); III. Fruit tangles (*Carpophytes*); IV. Mossworts (*Bryophytes*); V. Fernworts (*Pteridophytes*). More commonly, instead of II. and III. as given above, we have II. *Algæ,* and III. *Fungi,* based upon physiological instead of structural characters.

Cryptog'raphy, art of writing or telegraphing in cipher, *i.e.*, in such a way that the writing cannot be read by anyone not in possession of the key. Almost any person who has taste for the solution of puzzles or enigmas can understand most writing of this kind; and it is probable that no kind of cipher could be invented which would be proof against systematic and ingenious decipherers. Military and naval signals resemble cryptographic writing in this respect. See CODE, TELEGRAPHIC.

Cryp'ton, or Kryp'ton, atmospheric element, discovered, 1898, by Sir Wm. Ramsay, Prof. of Chemistry in University College, London; a gas obtained from the residue of evaporated liquid air; has the peculiar characteristic of argon—inertness; specific gravity, 2373; is nonatomic, *i.e.*, its atoms do not combine to form molecules; corresponds in chemical activity to helium; one portion supposed to exist in every 20,000 portions of air.

Crys'tal-gazing. See CRYSTALLOMANCY.

Crys'talline Lens. See EYE.

Crystalline Schists, generic term designating more or less perfectly crystalline rocks which possess a distinct foliation or parallel structure. Such rocks are more abundantly developed in the earth's crust than any others. By far the most common of the crystalline schists is gneiss, which always contains feldspar. Others are hornblende, mica, sericite, quartz, chlorite, and ottrelite schists, crystalline limestone, and quartzite. Many banded and foliated gneisses have the same chemical and mineralogical composition as well-known igneous rocks.

Crystallog'raphy, science of crystals. A crystal is a natural or artificial solid, bounded by plane surfaces, symmetrically arranged around certain imaginary lines called axes. The Greek word *Krystallos* means "ice"; it was applied to the transparent variety of quartz, because it was thought that rock crystal was water turned into stone, and this idea was not challenged until the seventeenth century. The word was later applied indifferently to any solid which assumed a geometrical shape by natural laws.

All crystals may be referred to seven systems, six of which are referred to three axes, and one of them to four. These systems are divided into two classes, according as the axes are or not at right angles. Those which are at right angles are called the orthometric, and those which are not are called clinometric systems. In each class there are three varieties. When all the axes are equal and at right angles, the system is called isometric. When only two are equal, but all at right angles, it is called the tetragonal. When none of the axes is equal, but all are at right angles, it is called the orthorhombic. The clinometric systems are called, respectively, the monoclinic, the diclinic, and the triclinic, according as the axes have different inclinations. The single system of four axes is called the hexagonal. In all of these systems one axis is placed upright, and is called the vertical axis. In the isometric, tetragonal, and hexagonal systems the other axes are simply called the basal axes, while in each of the other systems each axis has its own name. The axes always terminate in homologous parts, whether these parts are edges or angles.

In every crystalline system a single form is taken as the base of the system. Any form belonging to the system may be taken for this base, but it is generally conceded to adopt pyramids. From this form all the others are derived by three very simple laws: (1) All the similar parts of a crystal may be similarly and simultaneously modified. This gives rise to holohedral forms, *i.e.* showing all the planes required for full symmetry on both sides of the base plane. (2) Half the similar parts may be similarly and simultaneously modified. This gives rise to hemihedral forms, or those with half the number of faces requisite for entire symmetry; which in some of the systems are known as inclined, parallel, or gyroidal forms. (Gyroidal forms are those with the planes arranged spirally about a vertical line.) (3) One quarter of the similar parts may be similarly and simultaneously modified, giving rise to tetartohedral forms; those with one fourth the plane faces called for by full symmetry. In the isometric system the modifications may be composed of one, two, three, or six planes; in the tetragonal and hexagonal, of one and two; in the orthorhombic, monoclinic, declinic, and triclinic, of only one plane at a time.

Crys'tallomancy, ancient mode of divining by means of a transparent body, as a precious stone, crystal globe, etc. The operator first muttered over it certain formulas of prayer, and then gave the crystal (a beryl was preferred) into the hands of a young man or virgin, who received an answer from the spirits within the crystal.

Ctesibius (tē-sĭb'ĭ-ŭs), Greek mechanician who flourished under Ptolemy Philadelphus and P. Euergetes, at Alexandria, about 150 B.C., and was famous for his inventions. We owe to him and his pupil, Hero Alexandrinus, the pump, the bent siphon, the discovery of the elastic force of air, and its application as a motive power.

Ctesiphon (tĕs'ĭ-fŏn), Athenian who proposed that a crown of gold should be given to Demosthenes for his public services; for this act he was prosecuted by Æschines, and defended with success by Demosthenes in his famous oration, "On the Crown," 330 B.C.

Ctesiphon, ancient city of Assyria; on the Tigris; 20 m. SE. of Bagdad; the capital of the kings of Parthia. The site is now occupied by a village called Modain.

Cuanza (kwăn'zä), or **Quan'za,** largest river of Angola, W. Africa; rises in Lake Mussombo, on a plateau 5,500 ft. above the sea, flows 750 m. to the Atlantic; navigable by steamboats from the ocean to Dondo, 120 m.; its mouth is 2,000 ft. wide.

Cu'ba, independent republic; largest island of the Antilles; for many years the chief col-

ony of Spain; between the Caribbean Sea on the S. and the Gulf of Mexico and Bahama Channel on the N.; 130 m. S. of Florida; 780 m. long from E. to W., and 25,130 m. wide; area, with adjacent small islands and Isle of Pines, 43,840 sq. m.; pop. (1907) 2,048,980, of which about one third are negroes. Cuba probably had its origin in volcanic action, as demonstrated by the mountain chain (Copper Mountains), which traverses its whole length. From the bases of this chain N. and S. the country expands into broad meadows, with frequent lagoons and swamps. There are good harbors with deep water at Havana, Matanzas, Puerto Principe, Santiago de Cuba, etc. The climate in the hills is healthful and agreeable; in the lowlands, sickly and generally hot. Cuban mineral products include copper, gold, silver, iron, coal, marble, lead, petroleum, zinc, graphite, manganese, asphaltum, etc. The mountains are covered with forests of mahogany, ebony, granadilla, rosewood, cedar, live oak, fustic, palms, and plantains. The cultivated districts yield large crops of maize, rice, yams, bananas, sugar, coffee, tobacco, cotton, and all tropical fruits sugar and tobacco being the leading products, while immense herds of cattle are reared on the grazing lands. Some of the largest sugar estates are owned by citizens of the U. S. Chief exports are sugar, tobacco and cigars, fruits and nuts, rum, and timber; value of imports, 1907, $105,218,206; exports, $116,592,648; imports from the U. S., 1906, $51,309,000; exports to, $90,874,000. Nearly all the sugar and a large proportion of the fruits are sent to the U. S. The exports of tobacco are divided between the U. S. and Europe. Chief industries are mining and the manufacture of sugar, molasses, rum, and cigars, preparation of coffee, preserving fruit, and bleaching wax. There are about 1,897 m. of railway, and 5,065 m. of telegraph line. The oldest and most profitable railways are owned and operated by Englishmen.

Cuba's revenue for 1905–6 was about $19,199,000; expenditure, $19,138,000. Roman Catholicism is the prevailing religion, but there are flourishing Protestant missions and churches. Education was made obligatory, 1880. Spanish is the universal language. The official money of the republic is the U. S. currency, but fees of registers of property are collected in Spanish gold. In wholesale trade Spanish gold is the basis of circulation, and in the retail trade and in the country Spanish silver is almost entirely used.

Cuba was discovered by Columbus, October, 1492; colonized by Spaniards, 1511; negro slavery soon introduced; tobacco monopoly enforced, 1717-1816; negro insurrections, 1844–48; offer of $100,000,000 for Cuba made by President Polk, 1848; insurrections led by American adventurers, 1849–51; attempt for independence, 1868–80; slavery abolished absolutely 1886; new rebellion began, 1895; republic of Cuba formed, but recognition refused by the U. S.; 200,000 troops sent from Spain; blowing up of the U. S. battle ship *Maine* in Havana Harbor February 15, 1898, followed by resolutions by the U. S. Congress, adopted April 19th, declaring Cuba independent, and demanding the withdrawal of Spain from the island. War followed, and the island was evacuated by Spanish troops January 1, 1899; treaty of peace signed December 10, 1898. Cuba practically a dependency of the U. S. until a constitution was adopted and a stable government assured; first congress assembled May 5, 1902; Tomas Estrada Palma inaugurated president May 20th; reciprocity treaty with the U. S. signed December 12th; permanent treaty May, 1903, securing for the U. S. coaling stations at Bahia Honda and Guantanamo; insurrection against the government, 1906, led to the suggestion of terms of peace by the U. S.; these were rejected by President Palma, who soon resigned. Congress, unwilling to elect another president, William H. Taft, U. S. Secretary of War appointed provisional governor, until a new government should be elected; succeeded October, 1906, by Judge Charles E. Magoon. On January 24, 1909, the provisional government came to an end and a new president assumed office.

Cube, a solid body contained by six equal squares. It is also called a regular hexohedron, and is one of the five regular solids, *i.e.*, those whose faces are all equal. It is a form which often occurs in nature, especially among crystals. In arithmetic the cube of a number is its third power, or the product obtained by multiplying that number by its square. The duplication of the cube, *i.e.*, the finding of a cube having double the volume of a given cube, is one of those problems which admit of no solution by the geometry of the right line and circle. On this, as on the quadrature of the circle and the trisection of an angle, a vast amount of ingenuity has been vainly expended. The solid contents of a cube are equal to the third power of the number which expresses the length of one of its sides.

Cu'beb, the dried, unripe fruit of the *Cubeba officinalis* (and probably of other species), climbing woody plants belonging to the order *Piperaceæ*. The cubeb vine resembles that which produces the ordinary black pepper. Cubebs are brought chiefly from Java, Penang, etc., and are used as an aromatic and stimulant diuretic. Their active properties depend on the volatile oil which they contain. They also have a crystallizable principle called "cubebin," and a balsamic resin. The oil, tincture, and extract are used in medicine.

Cu'bit, linear measure of the ancients, equal to the length of a man's arm from the elbow to the tip of the middle finger. It is generally stated to be 18 English in. The ancient Egyptian cubit, or "cubit of Memphis," was about 20.7 in. According to Newton, the cubit of Babylon was very nearly 24 British in.; the royal cubit of Persia, 21.195 in.; the cubit of the Romans, 17.406 in.; the cubit of the Greeks, 18.1308 in.; the Egyptian cubit in use in 1737, 21.888 in.; the sacred cubit of Moses not greater than 24.9389 in., nor less than 24.7262, its probable value being 24.7552 in. The value of the biblical "cubit of a man" is extremely uncertain. Dr. William Smith, in his "Dictionary of the Bible," inclines to


GULF OF MEXICO
Nicholas Channel
TROPIC OF CANCER
HAVANA HARBOR
SCALE OF MILES
Gulf of Mexico
Morro Castle
La Cabaña Castle
Ft. San Diego
Punta Castle
Prison
Casa Blanca
Cuartel de la Fuerza
Custom House
Post Office
HAVANA
Hospital de Paula
Navy Yard
Almacenes de Regla
Regla
Marimelena Bay
Gas Works
Arsenal
Atares Castle
Pinar del Río
La Habana
Matanzas
Las Villas
Camagüey
Oriente
Isla de Pinos
Jardines de la Reina
Golfo de Cazones
Bahía de Cortés
Laguna de Cortés
Trinidad
Sancti Spíritus
Ciego de Avila
Gran Bajo de Buena Esperanza
Canal de las Doce Leguas
Golfo de Guacanayabo
Santiago de Cuba
Puerto Baiquiri
Guantánamo
Baracoa
CARIBBEAN SEA
PACIFIC OCEAN
Bay of Campeche
Veracruz
Tampico
Mexico City
Monterrey
Laredo
Chihuahua
Durango
Guadalajara
Acapulco
Tehuantepec
Yucatan
Campeche
Belize
Honduras
Tegucigalpa
San Salvador
LITTLE CAYMAN
CAYMAN BRAC
MEXICO
SCALE OF MILES
0 20 40 80 120
CUBA
SCALE OF MILES
0 10 20 40 60 80 100
JAMAICA
Kingston
Port Royal
Falmouth
Montego Bay
Holland Bay
HAITI
C. Dame Marie
Dame Marie
C. des Irois
Irois
C. Tiburon
Jeremie
Latitude
Longitude 82° West from Greenwich 80°
112° Longitude 108° West from 104° Greenwich 100°
BOBMAY & CO., N.Y.

regard it as having had a value of 23 digits, or 18.257 in., each digit being 0.7938 in.

Cuck'ing Stool, instrument of punishment formerly used in Great Britain, consisting of a stool or chair in which the offender was placed in front of his or her own door, and subjected to the jeers of passers-by. Common scolds were placed in it and then ducked under water.

Cuckoo (kŏk'ō), bird of the genus *Cuculus* and allied genera, belonging to the family *Cuculidæ*. They all agree in having the fourth outer toe turned backward like the parrots, although they are not climbers, Many of the species have the habit of making no nest, depositing their eggs in the nests of other and smaller birds. The most noted among them is the European cuckoo. It is a little over 1 ft. in length; the greater part of the plumage is ashy gray, but the under side is grayish with black bars; the wings and tail are black, the latter with white spots. The coucals, or ground cuckoos, of the genus *Centropus*, are large species, characterized by a long straight claw on the inner toe. They are found from Africa, eastward to Australia, are poor flyers, but run well. They nest upon the ground and raise their own young. The golden cuckoos are small birds whose plumage, like that of humming birds, glows with metallic greens and coppery red. They inhabit the warmer portions of Africa, Asia, and Australia. The giant of the family is the Australian channel bill, a bird 2 ft. in length, with a large bill. The common cuckoos of the U. S. are the yellow-billed and black-billed both found from the Rocky Mountains eastward, the first also on the Pacific coast. They are both satiny, olive gray above, white below, with long tails tipped with white. They build flimsy nests of twigs, and lay four or five pale greenish-blue eggs.

Cucumber (kū'kŭm-bĕr), one of the *Cucurbitaceæ*; cultivated from the earliest times, and supposed to have come from India. It is closely allied to the muskmelons, and it is commonly supposed that the two species will cross or mix, but this notion is unfounded. The so-called snake cucumber belongs to the muskmelon species. There are about seventy varieties of cucumbers offered by American seedsmen. The so-called English or forcing varieties differ from the common kinds chiefly in their greater length—often reaching 30 in. —larger leaves and flowers, and the readiness with which they grow in glass houses. These are much prized in England. The cucumber demands a rich warm soil. It is quickly injured by frost. Small cucumbers are extensively used as pickles, the smallest varieties being called gherkins. The term gherkin is often applied to the burr or W. Indian cucumber. This is a very different plant from the common cucumber, producing a small, prickly, short oblong fruit.

Cud'worth, Ralph, 1617–88; English philosopher; b. Somerset; son of Ralph Cudworth; fellow and tutor Emmanuel College, Cambridge, 1639; Master of Clare Hall, 1644; Prof. of Hebrew, 1645; Master of Christ's College, 1654; Prebendary of Gloucester, 1678; wrote "the True Intellectual System of the Universe" and "Treatise Concerning Eternal and Immutable Morality."

Cuernavaca (kwĕr-nä-vä'kä), city of Mexico; capital of state of Morelos; 25 m. W. of Popocatepetl; elevation, 5,380 ft.; was captured by the Spaniards, 1521, and was a favorite winter resort for both Cortes in the sixteenth century and Maximilian in the nineteenth. Pop. (1900) 9,584.

Cu'fic Writ'ing, so named from the town of Cufa, where the transcribing of ancient manuscripts was extensively carried on; one of the most ancient forms of Arabic writing, supposed to have been introduced into Arabia a short time before the period of Mohammed; was in common use till the tenth century, and afterwards was confined to coins and inscriptions.

Cuirass (kwē-răs'), armor for the body from waist to neck; made of hammered metal in large pieces, usually one breastplate and one backpiece secured together by straps, and known as a pair of cuirasses. The breastplate alone is sometimes called the cuirass.

Cuirassiers (kwē-răs-sērz'), heavy cavalry in the French, German, and Russian armies, wearing the cuirass and helmet; a survival of the troopers of the sixteenth and seventeenth centuries who wore a similar protection. The German and Russian armies have cuirassiers, and in England the Life Guards and Royal Horse Guards wear cuirasses, but not when in active service.

Cuitlahuatzin', or **Citlahuatzin** (kōt-lä-wät-zēn'), abt. 1470–1520; Mexican sovereign; younger brother of Montezuma II; led the Aztecs in the assault on the building where the Spaniards were quartered, and against the causeway during the retreat of the *Noche Triste* (June 30, 1520), Montezuma being now dead; elected sovereign, but not without resistance and tumult, in which four princes, brothers and sons of Montezuma, perished. His installation was celebrated with the usual human sacrifices, in which the Spaniards captured on the *Noche Triste* were slain. Less than three months afterwards he died in a pestilence which swept over Mexico.

Cujas (kū-zhäs'), **Jacques,** 1522–90; French jurist; b. Toulouse; in 1577 Prof. of Law at Bourges. His lectures on the "Institutes" attracted students from all parts of Europe. He developed a reform in modern law inaugurated by Alciat. The Roman law received a thorough interpretation from him, and according to its principles, which had until then been adopted partially as expediency suggested, the doctrine of the law was fundamentally renovated.

Culdees', name first used in the eighth century as the designation of an order of Celtic ecclesiastics chiefly found in Scotland and Ireland. Some of the Culdees were monks. Communities of Culdees existed in Armagh, Ire-

land, until the time of the Reformation, and were resuscitated, 1627, but had only a brief existence.

Cul-de-sac', street or alley open at one end only; a blind alley; in natural history, buildings, topography, and military language, the term is used for a passage with only one outlet.

Cullo'den, also called **Drummossie Moor**, battlefield of Scotland; a desolate table-land, now partly cultivated; in Inverness-shire, 6 m. ENE. of Inverness. Here the royal army, commanded by the Duke of Cumberland, totally defeated the Young Pretender, April 16, 1746.

Culm, in botany, the peculiar cylindrical hollow and jointed stem of the grasses; also a popular name given in some parts of England to anthracite coal; also common in British and American mining regions in the sense of "coal dust," or "slack."

Culmina'tion, in astronomy, the passage of a celestial body over the meridian at the upper transit. The sun culminates at noon or midday, and the full moon culminates at midnight, 12 P.M. The term is also applied to the transit of a circumpolar star over the meridian below the pole. It is then called the lower culmination.

Cul'peper, Thomas (second Lord), d. 1719; colonial executive; with the Earl of Arlington was granted by Charles II, 1673, a territory including the whole of Virginia; governor of the colony, 1680–83.

Culross', seaport of Perthshire, Scotland; on the N. shore of the Firth of Forth, 22 m. NNW. of Edinburgh. The monastery of St. Serf was founded here about the sixth century. Culross was successively the seat of the Elgin and Dundonald families.

Cultur'kampf. See **Kulturkampf.**

Cul'verin, a cannon of the earliest days of artillery; in the sixteenth century was the heaviest gun used, throwing a shot of 15 lb. weight.

Cu'mæ, ancient and famous Greek city of Campania, on the Mediterranean, 11 m. W. of Naples; founded conjointly by colonists from Chalcis in Eubœa and Cyme in Asia Minor; became an opulent commercial city, built several harbor or port towns, among which was Neapolis, the present Naples, and for 200 years (700–500 B.C.) was the most important city of S. Italy. Cumæ was conquered by the Samnites, 417 B.C.; became a Roman *municipium*, 338; was famous as the residence of the Sibyl, and was the last stronghold of the Goths in Italy. In the thirteenth century, having become the rendezvous of a desperate gang of robbers, it was razed to the ground by the inhabitants of Naples.

Cumaná (kō-mä-nä'), seaport in state of Bermudez, Venezuela; on the Manzanares, 1 m. from the Gulf of Cariaco; exports, coffee, cacao, sugar, hides, and tobacco; settled by missionaries, 1512, but soon abandoned; refounded by Gonzalez Ocampo, 1520, and is thus the oldest city of European origin on the continent of America. Pop. abt. 1,200.

Cumberland and Tev'iotdale, Duke of, and Earl of Armagh, 1819–78; titles borne by the ex-King of Hanover, a prince of the blood in Great Britain, being first cousin to Queen Victoria; b. Berlin; married, 1843, to the Princess Alexandrina Marie of Saxe-Altenburg; succeeded as George V to the throne of Hanover, November 18, 1851, on the death of his father, Ernest Augustus; took sides with Austria against Prussia, 1866; and was deprived of his kingdom, which was annexed to Prussia September 20, 1866.

Cum'berland, Ernest Augustus (Duke of), 1845– ; eldest son of the preceding; heir to the throne of Brunswick, but excluded because of his refusal to abandon his claim to the throne of Hanover. The legitimate heir to two thrones, he has kept up a steady fight with Prussia for what he claims as rights ever since his father's death. The income of the Guelph Fund was restored to him, 1892, and strong influences have long been working to reconcile him and the Prussian authorities. In reply to an ultimatum adopted by the Diet of Brunswick, he issued a manifesto December 17, 1906, declaring that he was unable to give up his claim to the throne of Hanover, and proposing to leave the solution of the legal question whether his son shall succeed to the Brunswick throne to the decision of the imperial courts.

Cumberland, William Augustus (Duke of), 1721–65; third son of George II, King of England; commanded the allied army which was defeated by the French at Fontenoy, 1745; defeated the army of the Pretender at Culloden, 1746, and was censured for his cruelty in that battle; during the Seven Years' War commanded an English army, which was defeated at Hastembeck, 1757.

Cumberland, capital of Allegany Co., Md.; on the Potomac; 178 m. W. by N. of Baltimore; in population and commerce the second city in the state; is the head of navigation of the Chesapeake and Ohio Canal, and the shipping point for the semibituminous coal produced in the vicinity, which constitutes the principal traffic of that canal. Its industries comprise rolling mills for rails and bars and factories for railroad iron, a factory for steel, foundries, machine shops, glass works, flour and cement mills, railway car and repair shops, and numerous minor enterprises. Pop. (1906) 19,768.

Cumberland Gap, narrow pass through the Cumberland Mountains, on the line between Kentucky and Tennessee, and at the W. extremity of Virginia; an important strategic point in the Civil War, and strongly fortified by the Confederates; abandoned by them June 18, 1862, and occupied by the Union troops under Gen. G. W. Morgan. In September Morgan, who had been outflanked by Gen. E. Kirby Smith, and lacked forage and supplies, was compelled to destroy and evacuate the

works. September 9, 1863, a Confederate force under Gen. Frazer, who held the gap with a brigade of Buckner's troops, surrendered after a siege of four days to Gen. Burnside.

Cumberland Moun'tains, range of the Appalachian system, forming part of the boundary between Virginia and Kentucky; range extends in a generally SW. direction across Tennessee, dividing E. from middle Tennessee. These mountains here form an elevated plateau, seldom over 2,000 ft. high, but at some points nearly 50 m. across.

Cumberland Presbyte'rian Church, denomination which took its rise during the religious revival in Kentucky and Tennessee, 1801–3; organized in Dickson Co., Tenn., February 4, 1810, by Finish Ewing, Samuel King, and Samuel McAdam, members of the Cumberland Presbytery, which embraced the present Middle Tennessee Presbytery. This presbytery had been dissolved by the Synod of Kentucky, 1806, for licensing laymen who were uneducated and who would not accept some expressions in the Presbyterian Confession of Faith which seemed to them to imply the doctrine of fatality. Early in 1813 the presbytery was divided into three and constituted the Cumberland Synod; in 1816 a Confession of Faith—a modification of that of the Presbyterian Church—a catechism, and a system of church order were adopted; in 1828 the synod was divided into three synods, and a General Assembly succeeded; 1883 a revised Confession of Faith was adopted, the changes being in line of those made in the revisions in progress in the other Presbyterian churches. This Church is a recognized member of the Alliance of the Presbyterian churches; has spread throughout the West and South, and even to California; has under its patronage three universities and several colleges. In 1908 there were 983 ministers, 982 churches, and 80,102 communicants.

Cumberland Riv'er, affluent of the Ohio, rising among the Cumberland Mountains in Kentucky, near the SE. boundary of that state; flows nearly W., crosses the S. boundary of Kentucky, describes an extensive circuit in middle Tennessee, passes by Nashville, and returns into Kentucky; afterwards flows NW. and enters the Ohio at Smithland. The Cumberland and Tennessee rivers are only about 3 m. apart at a point nearly 20 m. from Smithland; length, estimated at 650 m. Steamboats can ascend it to Nashville, about 200 m. from its mouth, and is navigable above Nashville, at certain seasons, 400 m.

Cum'bria, ancient principality of the Cymri in Great Britain; comprised Cumberland in England and part of Scotland, namely, the SW. portion of the region lying between the Ribble and the Clyde; ruled by its own kings until abt. 950 A.D. Scottish Cumbria then became the Kingdom of Strathclyde.

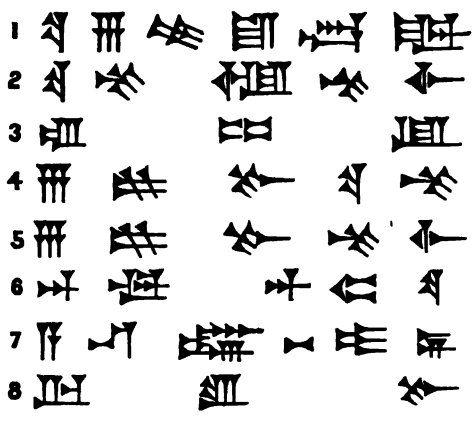
Cumbrian Moun'tains, range or group of mountains in the N. of England, occupying parts of Cumberland, Westmoreland, and Lancashire; highest point, Scafell Pike, 3,216 ft. This region, called the "English Lake District," is remarkable for its picturesque scenery, and is much frequented by tourists. Here are numerous lakes, the largest of which are Windermere and Ulleswater.

Cum'min or Cum'in Seed, fruit of a plant of the parsley family found in Egypt and adjacent countries. It has been cultivated from remote times (Isaiah xxviii, 25–27; Matthew xxiii, 23) for its seeds which have an aromatic taste and stimulating qualities; is used in cooking in Germany and Holland, and was esteemed medicinally by the ancients.

Cunax'a, ancient town of Babylonia; on the E. bank of the Euphrates; 60 m. N. of Babylon. In 401 B.C. a battle occurred here between Artaxerxes Mnemon, King of Persia, and his brother Cyrus (the Younger), in which the latter was defeated and killed.

Cune'iform, having the form of a wedge; applied to one of the bones of the wrist and to three of the tarsus; also to certain wedge-shaped characters found on ancient monuments, especially in Asia.

Cuneiform Inscrip'tions, ancient writings in wedge-shaped or arrow-headed characters peculiar to W. Asia; used also in Babylonia, Assyria, Armenia, Elam, Asia Minor, Palestine, Persia, and on the Euphrates in the Hittite country. The use in Palestine and the Hittite land was as early as the fifteenth century. The use of the cuneiform script in Persia does not seem to have antedated Cyrus the Great, sixth century B.C. The origin of this method of writing is prehistoric. Like all early systems, it developed from picture writing, in which each character was a representa-



Inscription from a clay tablet. It reports to the king (presumably Asshurbanipal) the arrival of the vernal equinox. It reads:

1. (On the) day 6th of (the) month Nisan
2. (the) day and (the) night
3. were equal,
4. 6 *kas-bu* (the) day
5. 6 *kas-bu* (the) night.
6. (The) god Nabu (and the) god Marduk
7. unto (the) king my lord
8. may they be gracious.

tion of an entire object or idea. Thus the sign for a hand was originally made of five straight lines representing the fingers  . In later times one of the lines was rejected, and the four horizontal wedges may be thought of as representing the fingers, while the perpendicular wedge represents the thumb  . The oldest forms of the writing are read from above downward, the columns, however, advancing from right to left. By changing the columns or lines to horizontal, the writing in later times came to read from left to right, as in English.

Gradually both curves and straight lines were discarded and only wedges were employed, the result of the use of soft clay and the form of the stylus, which was made by three plane surfaces meeting at a point like the angle of a cube. The stylus was pressed into the clay, tracing on this material being difficult. In the case of building bricks stamps were at times employed, so that an entire inscription containing name and titles of the royal architect was stamped by a single impression on the clay. The stone seals which were rolled over commercial documents imparted their carvings and inscriptions likewise to the soft clay. The stamps and seals thus described excepted, the writing on clay was a slow and painstaking process, the point of the stylus making the head and the line uniting two planes of the cube making the body or tail of the wedge. When the writing is on stone it is chiseled into likeness with that on clay. The number of wedges in a single character varies from one to fifteen or even more.

Out of the pictorial use of the script the ancient scribes derived a series of syllables. Their method was to employ a sign not only to represent an object, but also to represent the first syllable of the word expressing that object, and then they could use this syllabic sign in spelling any other word in which such syllable occurs. Thus the Accadian word for heaven is *ana*, and the sign  representing this word came to be used in spelling any word containing the syllable *an*, like the Semitic word *annu*, "this." The Persians derived an alphabet of some fifty characters from the syllabic script, but did not use it exclusively.

The separate signs of the cuneiform script are several hundred in number. Some of these are used only as ideograms, others very largely as syllables, some both as ideograms and as syllables. The context usually shows how a sign is to be understood. The wedges of the cuneiform script are arranged horizontally, perpendicularly, or obliquely downward or upward at an angle of about 45°. Complex signs may be composed of wedges arranged in all of these directions. The point of the wedge is toward the bottom or toward the right. There are separate signs for the vowels, but none for the consonants (except in the Persian). Each syllabic sign is composed of one vowel and one or two consonants, never more than two.

Cunha Barboza (kŏn'yă băr-bō'ză), **Januario da,** 1780–1846; Brazilian ecclesiastic and author; b. Rio de Janeiro; named preacher for the royal chapel, 1808; gained fame as a pulpit orator; was one of the most influential advocates of Brazilian independence; banished, 1823, but exonerated and allowed to return; several times deputy in the National Legislature; editor of the government journal; a director of the national library, and one of the founders of the *Instituto Historico e Geographico Brazileiro*; published many poems, mainly satirical.

Cu'par, capital of Fife, Scotland; on the Eden; 32 m. N. of Edinburgh; has a public library, the Duncan Institute, and manufactures of coarse linens, earthenware, etc. A castle or fortress of the Macduffs, thanes of Fife, formerly stood here.

Cu'pel, shallow and porous vessel, somewhat cup-shaped, generally made of bone earth; used in assaying gold and silver, which are fused with lead upon a cupel. The lead is oxidized in the process and sinks into the substance of the cupel, leaving the other metal pure.

Cu'pid, Roman name of the god of love, corresponding to the Eros of Greek mythology; usually represented as the son of Venus, but ancient authorities differ respecting his paternity; is represented as a beautiful winged boy, bearing a bow and arrows.

Cu'pola, word nearly synonymous with dome (*q.v.*), used especially of small domes crowning towers or belfries; commonly but erroneously applied to any lantern, observatory, or similar structure rising above the roof of a building; also the name of one form of blast furnace for reducing metallic ores.

Cup'ping, in surgery, the application to the skin of small cups from which the air is partly expelled; formerly employed to relieve congestion; if designed to withdraw blood from the patient, the skin was first scarified (scratched slightly) a partial vacuum produced in the cup by direct suction or by the flame of alcohol or of burning paper, and the mouth of the cup applied to the scarified surface. "Dry cupping" was the same process without scarification. In this case no blood was drawn, the object being to stimulate a diseased surface or to produce derivative action.

Curaçao (kū-ră-sō') one of the Dutch W. Indian Islands, of the Leeward group; 50 m. off the coast of Venezuela; area, 210 sq. m.; capital and principal town, Willemstad, at the entrance of an excellent harbor. The colony embraces besides this island Buen Ayre or Bonaire, to the E. of it; Aruba, to the W., and the islets of St. Martin, St. Eustache, and Saba in the Windward W. Indies. Klein Curaçao, a rock off the E. point of Curaçao, yields large quantities of phosphate of lime, and sea salt is obtained by evaporation. Curaçao was

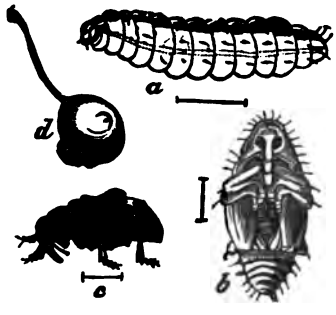
discovered by Ojeda, 1499, and Spanish colonies were established. It was seized by the Dutch, 1632, and held until the wars of the Empire, when it was taken by the English; restored to the Dutch by the peace of 1814. Pop. (1902) 31,371; of the other islands, 21,873.

Curaçao, a liqueur which is made by digesting Curaçao orange peel in diluted spirits with a little cinnamon, and often a little mace or cloves. The mixture is distilled and then sweetened with sugar.

Curare (kū-rā'rē), **Cura'ri, Ura'ri,** or **Woora'ri,** a poison used by S. American Indians upon their arrows, being an extract from several plants of the Strychnos family mixed with serpent venom. It kills by paralyzing the nerves of respiration. It deadens the ends of the motor nerves, causing total muscular paralysis without much change in the circulation, the lungs or the brain. It is used in experiments upon living animals. In medicine it has been given for cramps, lockjaw, hydrophobia, and epilepsy.

Curas'sow, several species of birds related to the crows and partridges. They inhabit the forests of S. America, N. of the Argentine Republic and E. of the Andes, one species only (*Crax globicera*) extending into Mexico. Curassows are mostly large birds, nearly equaling a turkey in size. They assemble in flocks, nest in trees, are readily domesticated, and are very good eating. The crested curassow (*C. alector*) is the most common species.

Curcu'lio, insect of a large group of the order of beetles; often called weevils, snout-beetles, etc. The name, particularly "curculio" is given to a small, dark-brown insect, speckled with yellowish white and black,



THE PLUM-TREE CURCULIO. *a.* Larva. *b.* Pupa. *c.* Beetle. *d.* Curculio, natural size, on young plum.

which attacks young fruit, such as apples, pears, apricots, etc., but especially the plum. The female makes a crescent-shaped puncture in which she deposits her egg. The egg soon hatches, and the maggot feeds on the young plum, which generally falls to the ground, and the larva burrows in the earth, becoming a perfect insect in three weeks. Several generations appear in one season. Another destructive curculio is the plum gouger, which occurs very abundantly in the W. U. S. It makes a round puncture. It undergoes transformation inside the kernel of the plum. Another insect of this genus makes numerous holes in the apple; still another lays her eggs in the cranberry, and then cuts off the stem. The grape curculio and other species are very destructive to grapes. Nearly 10,000 species of curculios have been described.

Cures (kū'rēz), ancient and famous city of Italy; capital of the Sabines; near the Tiber, 25 m. NNE. of Rome; celebrated in the early history of Rome as the birthplace of Numa, as well as the city of Tatius. The site is occupied by the village of Correse. Cures was colonized by Sulla abt. 100 B.C.

Cur'few, bell rung at eight in the evening as a signal for extinguishing lights and fires; said to have been introduced into England by William I, 1068; the custom existed in France, Spain, and other countries at the same time. It is still kept up in some parts of England and the U. S., though the hour seems to be later than eight, *e.g.,* in Cambridge, Mass., curfew strikes at half past nine.

Cu'ria (plural **Cu'riæ**), building in which the senate held its sessions in the cities of ancient Italy; also a subdivision of the Roman patrician tribes, each of which was divided into ten *curiæ.* These tribes were three in number, the Ramnes, Tities, and Luceres, so that there were thirty curiæ. In early times the curiæ were of the greatest importance; in later times they lost their political importance, but long retained their ancient and mysterious religious rites.

Curie (kü-rē'), **Pierre,** 1859–1906; French scientist; b. near Paris; Professor Physics at the Sorbonne. His wife, Sklodowska (1867–), b. at Warsaw, was his pupil before he married her. In 1898, while carrying on a series of researches upon the Becquerel rays, the Curies discovered the metal polonium, and then isolated from pitchblend the metal radium. (See RADIUM). Pierre Curie became Prof. of Physics and Chemistry at the Municipal School in Paris. He was killed by being run over by a wagon.

Curlew (kŭr'lū), bird of the genus *Numenius,* order *Limicolæ*; native of Europe and N. America. Curlews have long, slender, and curved bills, long legs and short tails. They frequent the seashore and open moorlands, feeding on worms, mollusks, insects, etc. The common curlew of England is pursued by sportsmen partly for its flesh, and partly because its shy habits render the pursuit exciting. Among the curlews of N. America may be mentioned the long-billed curlew of all the temperate parts. It is 25 in. long, the wing measuring about 11 in. The bill is often 8 in. long. It is of a pale reddish color, with ashy tints and brown-black marks, and lines of black. The short-billed curlew of the E. and W. coasts and the Eskimo curlew are smaller.

Curl'ing, Scottish game, played on the ice with hemispherical stone having iron or wooden handles rising from the top, with which

to slide the stones over the ice. The players are divided into two parties, and each person endeavors either to leave his own stone as near as possible to the "tee" (at the end of the "rink"), or to remove those of the opposite party, or to guard those of his own side. When all have played, the one nearest the tee counts one, and the second, third, etc., if on the same side, count each one more. The side that first scores 31 wins.

Cur'ran, John Philpot, 1750–1817; Irish orator; b. near Cork; called to the Irish bar, 1775; as a barrister was very successful, and distinguished for his humor and sarcastic speech; member of Parliament, 1783, in which he acted with the Opposition Party, of which Grattan was the leader; in 1806 Master of the Rolls of Ireland. He was an ardent supporter of Catholic emancipation and liberal principles generally.

Cur'rant, popular name of the berries of certain species of *Ribes*, low shrubs of the *Grossulaceæ*, distinguished from gooseberries by the flowers, which grow in racemes, and by the fact that the currant bush is never thorny. The red currant (*Ribes rubrum*) is a native



RED CURRANT

of Europe, Asia, and N. America. The black currant (*R. nigrum*), a native of Europe and the N. of Asia, is also cultivated, and in France *liqueur de cassis*, an agreeable variety of currant wine, is prepared from it. More than sixty species of currants are described, about two thirds of them American. The dried "currants" are really small grapes, so named from Corinth, whence they were exported.

Cur'rency, circulating medium, or the aggregate of means used for settlement of debts and commercial transactions. The term is a somewhat loose one, modern writers not being agreed whether bank checks or even bank deposits should be regarded as currency. In general, there is a disposition to apply the terms currency and money to the same things, the individual coin or bill being spoken of as money, and the aggregate of such coins or bills constituting the currency. Hence we speak of the value of money, but of the inflation of the currency. Currency in modern states consists of: (1) Metallic money under free coinage, with full legal tender. The gold currency of the U. S. is of this character. (2) Metallic money without free coinage, but with full legal tender. The silver dollars coined in the U. S. are of this sort. (3) Subsidiary coinage or small change, whose bullion value is almost never made equal to its nominal value, and which does not, as a rule, have the legal-tender character. (4) Paper money of various kinds, whether it be certificates of deposit, promises to pay with a legal-tender character, or promises without such character, like the U. S. national bank notes. The first and the fourth constitute by far the most important elements. The currency of the U. S. in circulation, June 1, 1909, was officially reported as follows: Gold coin, $605,243,676; gold certificates, $815,394,019; standard silver dollars, $70,740,226; silver certificates, $479,402,157; subsidiary silver, $131,336,952; Treasury notes of 1890, $4,320,519; U. S. notes, $339,522,807; national bank notes, $662,757,381; total, $3,108,662,406; circulation per capita, $35.01. See BULLION; COINAGE; DEMONETIZATION.

Cur'rent Me'ter, wheel driven by the motion of the water and which, placed in a stream, records its velocity by the number of revolutions. The simplest form is a small paddle wheel, but this can determine only the velocity of the surface. The modern forms have electric attachments which communicate with a recording apparatus on shore or in a boat.

Current Riv'er, in Missouri and Arkansas; rises in Texas Co., Mo.; flows SE. into Arkansas, and enters the Black River in Randolph Co.; length estimated at 250 m.; is navigated by flatboats and steamers. Jack's Fork enters the main stream from the W. in Shannon Co., Mo., and steamboats can ascend nearly to the union of the forks in good stages.

Cur'rer Bell. See BRONTË, CHARLOTTE.

Curtein (kŭr-tān'), name originally given to the sword of Roland, the point of which broke off when it was first tested. The name has since been given to the pointless sword carried, as the emblem of mercy, before the sovereigns of England at their coronation.

Cur'tin, Andrew Gregg, 1817–94; American lawyer; b. Bellefonte, Pa.; admitted to the bar, 1837; canvassed the state for Henry Clay, 1844; Secretary of the Commonwealth, 1854; governor, 1860 and 1863; displayed great energy and promptitude when the first call for troops came at the opening of the Civil War; minister to Russia, 1869–72; member of State Constitutional Convention, 1872-73; elected to Congress, 1880, 1882, and 1884.

Cur'tis, George Ticknor, 1812–94; American jurist; b. Watertown, Mass.; admitted to the bar, 1836; practiced in Boston; works include treatises "On the Rights and Duties of Mer-

chant Seamen," "On the Law of Copyright," and a "History of the Origin, Formation, and Adoption of the Constitution of the United States," "Life of Daniel Webster," and "Creation or Evolution."

Curtis, George William, 1824–92; American author and editor; b. Providence, R. I.; for a time a member of the Brook Farm Community, W. Roxbury, Mass.; on the editorial staff of the New York *Tribune*, 1850–52; one of the editors of *Putnam's Monthly*, 1852–57; contributed the "Easy Chair" papers to *Harper's Monthly*, 1853–92; leading editorial writer for that journal, 1857–92; popular as a lecturer and effective as a political speaker; delegate to the State Contitutional Convention of 1867, was chairman of its committee on education, and framed the provisions on the subject of education; Regent of the Univ. of the State of New York, 1864, and Chancellor, 1890; a powerful advocate of civil-service reform, and for a short time President of the National Civil Service Reform League; published "Nile Notes of a Howadji," "Lotus Eating," "Potiphar Papers," "Prue and I," "Trumps," "From the Easy Chair," etc.

Curtius (kŏr'tsē-ŏs), **Ernst,** 1814–96; German archæologist and historian; b. Lübeck; tutor of Crown Prince Frederick William, afterwards Frederick III; in 1856 succeeded C. F. Hermann at Göttingen, and was called to Berlin, 1865; superintended the excavations at Olympia, 1875–80. Among his many contributions to Greek history and archæology the most noteworthy are "Peloponnesos," "History of Greece," "Alterthum und Gegenwart," "Die Stadtgeschichte von Athen."

Curtius (kĕr'shē-ŭs), **Marcus, or Mettus,** patriotic Roman youth, who, as the legend ran, sacrificed his life for his country abt. 362 B.C. A chasm opened in the Forum of Rome, which the soothsayers declared could not be filled except by the sacrifice of the chief wealth or strength of the Roman people. Curtius, completely armed, plunged on horseback into the chasm, which immediately closed up.

Curtius, Quintus. See QUINTUS CURTIUS.

Cu'rule Chair, among the ancient Romans, a throne or chair of state, one of the emblems of former kingly power, retained by the magistrates of the republic; ornamented with ivory and later made of ivory inlaid with gold. Its use was limited to the consuls, prætors, curule ædiles, censors, the flamen dialis, and the dictator or his deputies. In later times the emperors, as well as many inferior officers, sat upon it.

Curve, a line which continually changes its direction, or, to speak with more accuracy, a line no part of which is straight. A plane curve is one all parts of which lie in the same plane; one not plane is called a curve of double curvature, or tortuous curve. In a plane curve we recognize at each point (1) the direction of the curve represented by the tangent line at that point; (2) the degree of curvature of the curve, represented by the rate at which the direction is changing as we pass along the curve, and equal to the curvature of a circle having the closest possible contact with the curve at that point.

In the case of a tortuous curve we have at each point (1) a certain direction, as in a plane curve; (2) an osculating plane, which means the plane having the closest possible contact with the curve at the point, or, in mathematical language, the plane containing two consecutive tangents, or three consecutive points of the curve; (3) the principal normal to the curve, being that normal or perpendicular which lies in the osculating plane, and therefore the same as the line in which the osculating plane intersects the plane perpendicular to the curve itself. The binormal is the normal perpendicular to both the osculating plane and the tangent to the curve. The curvature is equal to the curvature of the circle which lies in the osculating plane, and has the closest possible contact with the curve. The angle of torsion is the angle between two consecutive osculating planes.

Cur'wen, John, 1816–80; English clergyman; founder of the Tonic Sol-fa system of music; b. Yorkshire; educated for the Nonconformist ministry; took up the work which filled the rest of his life, 1841; issued his "Grammar of Vocal Music, 1843; founded the Tonic Sol-fa Association, 1853, and the Tonic Sol-fa College, 1879.

Curzolari (kôrd-zō-lä'rē) **Is'lands.** See ECHINADES.

Cur'zon, George Nathaniel (Baron), 1859– ; British statesman; Assistant Private Secretary to the Marquis of Salisbury, 1885; entered Parliament, 1886; his extensive travels in the East resulted in the publication of "Russia in Central Asia," "Persia and the Persian Question," and "Problems of the Far East"; awarded the gold medal of the Royal Geographical Society, 1895; Under Secretary for India, 1891–92; Under Secretary of State for Foreign Affairs, Privy Councilor, 1895–98; married Mary Victoria Leiter, of Chicago, Ill., 1898; Viceroy and Governor General of India, 1898–1905; elevated to the Peerage as Baron Curzon of Kedleston, 1898.

Cu'sack, Mary Frances, 1830–99; Irish nun, known as the "Nun of Kenmare"; b. near Dublin; member of a sisterhood of the English Church, but was soon converted to Roman Catholicism; joined the Irish Poor Clares, a community of Franciscan nuns at Kenmare, 1859; established there a convent of Poor Clares, 1861; founded a new order called Sisters of Peace, to establish homes for friendless girls and teach them domestic service, 1884; opened the first house in Nottingham, England, 1884; one in Jersey City, N. J., opened, 1885; published many works, including "Student's History of Ireland" and "Woman's Work in Modern Society."

Cush, in the Old Testament, the name (1) of a person, the first son of Ham (Gen. x, 6, 7, 8; I Chr. i, 8, 9, 10); (2) of the country near the Gihon (Gen. ii, 13; marg.); (3) of the Nile, the Nile Valley S. of Egypt from Syene

to the junction of the Blue and the White Nile (Gen. x, 6), inhabited by the Cushites, or Ethiopians, akin to the Egyptians and distinct from the negroes. In the Egyptian records the people of Cush are always distinguished from the negroes in name and appearance, they being always depicted with Caucasian features and of brown color.

Cush'ing, Caleb, 1800–79; American jurist; b. Salisbury, Mass.; for two years a tutor in Harvard; settled in Newburyport; elected to state legislature, 1825; Whig member of Congress, 1835–43; joined the Democratic Party, 1841; commissioner to China, 1843–44; negotiated the first treaty between the U. S. and China; equipped a regiment at his own expense and served as colonel and brigadier general in the Mexican War, 1847; Attorney-General of the U. S., 1853–57; was one of the counsel before the *Alabama* arbitration tribunal at Geneva, 1871; minister to Spain, 1874–77; publications include "The Practical Principles of Political Economy," "Growth and Territorial Progress of the United States," and "The Treaty of Washington."

Cushing, William Barker, 1842–74; American naval officer; b. Delafield, Wis.; entered the service, 1861; commissioned lieutenant, 1862; lieutenant commander, 1864; commander, 1872; distinguished himself especially by blowing up the ram *Albemarle* at Plymouth, N. C., 1864, and in the assault on Fort Fisher.

Cush'man, Charlotte Saunders, 1816–76; American actress; b. Boston, Mass.; made her *début* as a singer, 1834, but lost her voice; became an actress, appearing in 1835 as *Lady Macbeth* with great success, and removed to New York, where she played until 1840; accompanied Macready through N. U. S., 1844, and increased her fame as an impersonator of Shakespearean characters; acted and gave dramatic readings in the U. S., 1858, 1860, and 1871–75; retired 1875.

Cushman, Pauline, 1833–93; b. New Orleans, La.; was an actress up to the breaking out of the Civil War, when she was hired by the Federal government to secure information as to the S. sentiment in Louisville, Ky., and as to the methods of securing information and medical supplies. At Nashville she rendered valuable service in detecting thefts from government stores and the practices of guerrillas. She was at last captured and court-martialed as a N. spy and condemned to be hanged, but was left in prison at Shelbyville, when that place was evacuated by the Confederate army, and was released when the Federals arrived. After her escape she was given by the soldiers the title of major, and was accoutered as an officer.

Cus'ter, George Armstrong, 1839–76; American military officer; b. New Rumley, Ohio; graduated at West Point, 1861; served in the Civil War in the Manassas campaign, 1861; the Virginian Peninsula, 1862, as aid-de-camp to McClellan; Maryland campaign, 1862; Rappahannock campaign, 1863; Pennsylvania campaign, 1863; in operations in central Virginia, 1863–64; Richmond campaign, 1864; Shenandoah campaign, 1864–65; brevet major general for gallantry at Winchester and Cedar Creek and numerous smaller engagements; in command of the cavalry in the pursuit of Lee's army, 1865; in command of the cavalry in the military division of the SW. and Gulf, 1865; chief of cavalry in the Department of Texas, 1865–66; after the war was on W. frontier duty; killed by the Sioux Indians, on the Little Big Horn, Mont.

Cus'tis, George Washington Parke, 1781–1857; adopted son of George Washington; b. Mount Airy, Md.; was a grandson of Mrs. Martha Washington; produced several plays and orations, and wrote "Recollections of Washington."

Cus'toms, or Customs Du'ties. See PROTECTION; TARIFF.

Cuthæ'ans, or Cuth'ites, inhabitants of Samaria; so called in the Talmud and the Chaldee Scriptures, because Shalmaneser colonized that part of Palestine with people from Cuthah, a district of Asia, and these colonists formed with the few remaining natives a mixed race.

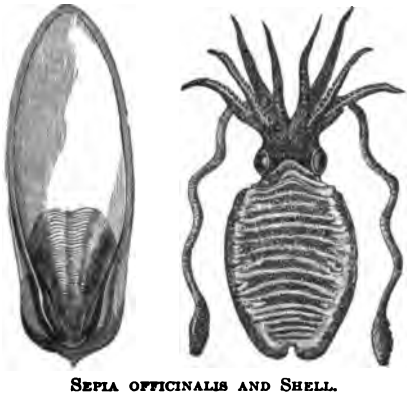
Cuth'bert, English saint; b. near Melrose-on-the-Tweed; entered the abbey there, 651; became its prior, 664; later prior of Lindisfarne; retired in 676, and till 685 led a solitary life on Farne or House Island; consecrated Bishop of Lindisfarne, 685, but, 687, gave up his bishopric and retired to his cell on Farne Island, where he died; had the credit of working miracles.

Cuthbert Bede. See BRADLEY, EDWARD.

Cut'lery, sharp and cutting instruments of iron or steel. The most primitive cutting instruments were flints, shells, etc., which were succeeded by bronze implements and weapons, and these in turn by iron. In recent years the use of wrought iron for cutlery has been superseded by all kinds of steel, such as Bessemer, open hearth, and crucible, for different classes of instruments. For the finest instruments only the best crucible steel is used. Formerly only the cutlery made in Sheffield, England, was of the highest grade—that is, for the one hundred years following Benjamin Huntsman's invention of cast steel, in 1770—but now excellent cutlery is made in the U. S. and elsewhere. Many centuries ago swords and knives were made in Damascus, and also, during the Middle Ages, in Spain (especially at Toledo) and Italy of qualities equal to the best now produced. Cutlery is made almost exclusively by forging, hand forging for knives and small pieces, and forging under a power-driven helve hammer for large pieces. The drop forging press (introduced about 1860) is superseding hand forging. For a fine quality of cutlery two things are essential: first, the selection of steel of the quality proper for the particular instrument; and, second, skill in forging at the right heat and in tempering. The element of personal skill is now rendered less important by the adoption of heating furnaces, whose temperature is regulated by pyrometers, and in regulated tempering and annealing baths and furnaces. The old method of drawing the

temper, in which the extent of drawing is regulated by the workman's judgment of the color formed by a coating of oxide on the brightened surface of the hardened steel, is being superseded by the method of placing the articles in an oven of regulated temperature for a definite time. Axes and other cutting instruments which have a heavy thick portion and a cutting edge are commonly made of two kinds of steel, the former of a soft cheap steel and the latter of the finest crucible steel.

Cut'tlefish, certain mollusks, especially the species from which sepia is prepared. They have an ink bag filled with black or brown "sepia," a substance which the animal ejects when pursued, so as to conceal itself from view by coloring the waters around it. This substance was formerly much employed in



SEPIA OFFICINALIS AND SHELL.

making sepia or India ink. "Cuttlebone" (sometimes called *calamary*) is the internal shell of these animals. When powdered it is sold under the name of "pounce," is put in bird cages, and is used for polishing, for tooth powder, and in making molds for delicate castings. Cuttlefish weighing two tons have been caught in tropical seas. Many fossil species occur. Several species are found on the Atlantic coast of the U. S.

Cuvier (kü-vē-ā'), **George Chrétien Léopold Frédéric Dagobert** (Baron), 1769–1832; French naturalist; b. Montbeliard; Professor of Comparative Anatomy in the Museum of Natural History in Paris, 1795; admitted into the Institute, 1796, just founded; displayed his genius for classification in a work called "Tableau Elementaire des Animaux," and succeeded Daubenton as Professor of Natural History in the College of France, 1800. In 1801 he commenced the publication of the important "Leçons d'Anatomie Comparée"; chosen perpetual secretary of the Academy of Sciences, 1802; councilor to the Imperial Univ., 1808. In his "Discourse on the Revolutions of the Surface of the Globe" he propounded the theory of the correlation of forms in organized beings; published, 1817, his celebrated "Animal Kingdom." Soon after the restoration of the Bourbons appointed chancellor of the Univ. of Paris by Louis XVIII; elected to the French Academy, 1818; received the title of baron, 1820; created a peer of France, 1831. Among his other works is an excellent "Natural History of Fishes." He first applied to zoölogy the natural method, and founded a system on the basis of the invariable characters of anatomical structure. He is regarded as the founder of the science of comparative anatomy.

Cuxha'ven, fortified seaport of Germany, at entrance of the Elbe into the German Ocean; 58 m. NW. of Hamburg; has one old and two new ports, the first used as a harbor of refuge for shipping, the others for fishing and seagoing vessels.

Cuzco (kōs'kō), interior city of Peru; capital of department of same name; on irregular table-land or terrace, 11,380 ft. above the sea. To the NW. the hill of Sacsahuaman rises high above, and two streams flow down through the city in ancient walled channels—the work of the Incas. Cuzco is the most ancient city of Peru, and perhaps of America; was the birthplace of the Inca power, capital of their empire, which eventually spread over a great part of the Andean region; according to tradition was founded by Manco Capac in the twelfth or thirteenth centuries. At the time of the conquest the city proper probably had 50,000 inhabitants, with as many more in the immediate vicinity. The streets were narrow, crossing each other at right angles, and paved with pebbles; near the center was a large square, and from this radiated four streets to the four great Inca roads. The houses of the better class were built of stone, and covered with elaborate and handsome thatched roofs.

The glory of Cuzco was the *Ccuri-cancha,* or great temple, commonly called the Temple of the Sun; 296 ft. long by 52 broad; originally built for a palace of the Incas; interior of main hall was lined in great part with thin gold. On the Sacsahuaman hill is the great fortress of Cuzco, which probably was built before the time of the Incas; is a fortification 600 ft. long, consisting of three walls, one above the other on successive terraces. Pizarro entered Cuzco November 15, 1533; the city was speedily rifled of its gold; was given a Spanish Govt., 1534; besieged, 1536, by the Inca Manco. Pop. abt. 30,000.

Cyane (sī'ā-nē), water nymph of classic mythology, who tried to rescue her playmate Proserpine, and was changed by Pluto into a fountain in Sicily. She is also called the wife of Æolus, god of the winds. The fountain Cyane, near Syracuse, still flows, and gives rise to a considerable river.

Cy'anide, salt of hydrocyanic or prussic acid which has the composition HCN, containing the elements hydrogen, carbon, and nitrogen. The cyanide which is manufactured in largest quantity is commonly called *yellow prussiate of potash,* or *potassium ferrocyanide.* From this, other cyanides, such as potassium cyanide, KCN, Prussian blue, etc., are prepared. Most cyanides are very poisonous. Some of them are of great importance in the arts, as in gilding, electroplating, photographing. Some are used in medicine.

Cyan'ogen, gas formed by heating mercuric cyanide. It is colorless, has the odor of peach kernels, and is extremely poisonous. It consists of the elements carbon and nitrogen, formula C_2N_2. With hydrogen it forms the powerful poison, prussic acid. All the cyanides are related to cyanogen, as the chlorides are related to chlorine and the iodides to iodine. The group CN enters into chemical compounds as the element, Cl, does, and is said to play the part of an element. Such a group is called a radical.

Cyanom'eter, instrument for measuring the blueness of the sky. It consists, essentially, of a disk divided into sectors, the several sectors being colored with tints of blue gradually increasing in intensity. Held between the eye and the sky, some sectors will appear deeper, and some lighter in tint than the heavens. That one where the difference is insensible is the measure of the blueness for the time being.

Cyax'ares I, d. 593 B.C.; King of the Medes; began to reign, 633 B.C.; waged war against the Scythians, who invaded his dominions, and against Alyattes, King of Lydia. A total eclipse of the sun which occurred abt. 610 B.C. induced Cyaxares and Alyattes to make peace. Cyaxares and the King of Babylon took Nineveh, 625; succeeded by his son Astyages, who reigned 593–69 B.C.

Cyaxares II, King of the Medes; son of Astyages, grandson of Cyaxares I, and uncle of Cyrus the Great; though not mentioned by Herodotus or Ctesias, is named by Xenophon as the successor of Astyages in the Median kingdom, and is probably the same as "Darius the Median" spoken of by Daniel (v. 31); supposed to have reigned in Babylon for two years after its conquest by Cyrus, 538 B.C.; came to the throne of Media, 569 B.C.

Cybele (sĭb'ē-lē), or **Rhea** (rē'ă), goddess of classic mythology, called in Phrygia and elsewhere in W. Asia "Mother of the Gods," or



CYBELE.

"Great Mother"; a daughter of Uranus and Terra, wife of Saturn (Cronos), and the mother of Jupiter. In Phrygia her priests were called *Corybantes.* She was sometimes styled the "Berecynthian mother," from the hill Berecynthus, where she had a temple. She is generally represented riding in a chariot drawn by lions, with a diadem of towers upon her head.

Cycads (sī'kădz), small family of trees and shrubs (*Cycadeæ*), related to the conifers, with which they agree in being gymnospermous; have mostly simple stems, with a large pith and large pinnately compound, evergreen leaves, clustered toward the summit of the



A LIVING CYCAD.

stem; are of slow growth and long lived; stem elongates by a slowly unfolding terminal bud, much as in the palms, which they resemble so remarkably that they are popularly called "sago palms." Fossils show that cycads are of great antiquity, and once a prevalent form of vegetation. They are now confined to the tropics.

Cyclades (sĭk'lă-dēs), group of twelve islands in the Ægean, according to Strabo, so called because they surrounded the sacred island of Delos—named Syra, Delos, Andros, Tenos, Mykonos, Naxos, Paros, Antiparos, Siphnos, Seriphos, Kythnos, and Keos. The nomarchy of the Cyclades in the modern kingdom of Greece includes, in addition to the above, the following islands: Melos, Thera, Kimolos, Pholegandros, Sicynos, Ios, Amorgos, and Anaphe. Pop. of the nomarchy (1896) 134,747; area, 926 sq. m.; Syra, or Hermopolis, most important city.

Cyclamen (sĭk'lă-mĕn), plants of a genus of the primrose family. There are two chief species in cultivation, *Cyclamen europæum* and *C. latifolium.* The former is the fragrant and the hardier species, and is native to the S. of Europe. The latter comes from Persia. The flower is one of the oddest in form its brilliant

petals being strongly reflexed, giving it the appearance of being turned inside out. A plant of this genus is known as sow bread, from the fondness of swine for its tubers.

Cy'cle, period of time which finishes and recommences perpetually. The term has been employed for marking the intervals in which two or more periods of unequal length are each completed in a certain number of times, so that both begin again exactly in the same relations as at first. The cycles used in chronology are three: the cycle of the sun, the cycle of the moon, and the cycle of indiction. The cycle of the sun, or solar cycle, is a period of time after which the same days of the week recur on the same days of the year. If the number of days in the year were always the same, this cycle could only contain seven years; but the order is interrupted by the intercalations. In the Julian calendar, the intercalary day returns every fourth year, and the cycle consequently contains twenty-eight years. The cycle of the moon is a period of nineteen solar years, after which the new and full moons fall on the same days of the year as they did nineteen years before. This cycle was invented by Meton, an Athenian astronomer, and is known as the "Metonic cycle." The cycle begins with the year in which the new moon falls on January 1st. To find the number of any year in the lunar cycle, or the golden number of that year, we have this rule: add one to the date and divide by nineteen; the quotient is the number of cycles elapsed, and the remainder is the year of the cycle. Should there be no remainder, the proposed year is the last or nineteenth of the cycle. The cycle of indiction, or Roman indiction, is a period of fifteen years, not astronomical, but entirely arbitrary. Its origin and purpose are alike uncertain, but it is conjectured that it was introduced by Constantine the Great about 312 of the common era. See CALENDAR; CHRONOLOGY.

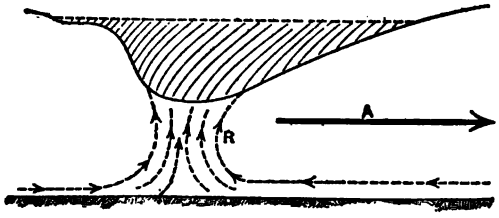
Cyclom'eters, instrument for recording the number of revolutions made by a wheel, and, the circumference of the wheel being known, of calculating the distance traveled. In its simplest form it is a toothed wheel, the teeth being caught and moved forward by a pin upon the wheel, whose revolutions are recorded and shown on the margin of the toothed wheel or carried to a dial. If the recording wheel has ten teeth, the tenth may have a projection which will move another toothed wheel, which will in turn register tens, and additional wheels will record hundreds, and thousands, etc. A double arrangement permits one set of recorders to be put back to zero, while the total number shown is carried forward by the other set, thus enabling one to see, *e.g.*, how much distance has been covered each day, while the total mileage of the trip is also shown. The cyclometer may be further elaborated to show, with the distance, the rate charged per mile, for different numbers of passengers, etc., a device now used on the taxicabs.

Cyclope'dia, or Encyclope'dia, a compilation usually, but not always, in alphabetic arrangement, imparting information, more or less complete, upon the whole circle or range of human knowledge. The most noted of the earlier cyclopedic works were the work of Speusippus (the nephew of Plato, d. B.C. 339), not now extant; the great collections of Varro, of the Elder Pliny, of Stobæus, Suidas, Isidorus, Capella, and Vincent de Beauvais, crude summaries of the then known arts and sciences. The work of Alfarabi, of Bagdad (d. A.D. 950), is also worthy of mention. The Chinese have at different periods produced remarkable and voluminous encyclopedias. The "Tai-ping-yu-lan," in 1,000 books, was compiled by order of the second emperor of the Sung dynasty, and completed in 983. In 1568 a new edition of 500 sets was printed from movable type, and a later one in 1812. In the reign of the second emperor of the Ming dynasty a great cyclopedia, the "Yung-lŏ-ta-tien," was compiled in 22,877 books (with sixty books of tables of contents). It comprised the whole round of Chinese learning—classical, historical, philosophical, and literary—embracing astronomy, geography, medicine, the occult sciences, Buddhism, Taoism, and the arts. Over 2,000 scholars were engaged in the work, which was finished in 1407. No complete copy is now in existence. In the period K'ang-hi, the second of the present dynasty, the "T'u-shu-tseih-ch'ing," in 10,000 books, forming 5,020 volumes, was prepared, and printed at Pekin by imperial command, from movable copper type, in 1726. A copy of this immense work was secured in 1877 for the British Museum. The indexes extend to twenty volumes more.

The earliest modern encyclopedia was that of J. H. Alsted (1588–1638), in thirty-five books in 1630. In the eighteenth century the principal works were Ephraim Chambers's "Cyclopædia" (two volumes, 1728); Zedler's "Universal-Lexikon" (sixty-four volumes, Leipzig, 1732–50); the French "Encyclopédie," replaced (1865–80) by Larousse, "Grand Dictionnaire Universelle du XIX^me^ Siècle," published in fifteen volumes, large quarto, with two supplementary volumes of the same size; the "Encyclopædia Britannica" (three volumes, 1771; second edition in ten volumes, 1776–83; third edition in eighteen volumes, 1797). The "Conversations-Lexikon" of F. Brockhaus (Leipzig, 1813), of which thirteen editions have appeared, was the basis of many other cyclopedias. See DICTIONARY; GAZETTEER.

Cy'cloid, plane curve generated by a point in the plane of a circle when the latter is rolled along a straight line. If the generating point is in the circumference of the rolling circle, a "common cycloid" is generated; if the generating point be outside the circle, it marks a "curtate" cycloid; while if it be a point within the circumference, a "prolate" or "inflected" cycloid is the result. That part of the cycloid which is generated in one revolution of the generating circle is called one "branch" of the cycloid. That part of the straight line which is traversed in one revolution of the generating circle is the "base" of one branch. A line bisecting the branch of a cycloid and its base is the "axis." The common cycloid is the "line of quickest descent."

Cy'clone, a whirling storm of large horizontal dimensions, usually preceded by a calm and a great fall of the barometer. The whirling character of these storms was not discovered until abt. 1825. A cyclone is characterized by



SECTION OF A CYCLONE SHOWING THE CLOUD CAP, INFLOWING WINDS R, AND DIRECTION OF MOTION, A.

a center of low atmospheric pressure toward which there is a spiral inflow of air. The inflow is against the sun (contra-clockwise) in the N. hemisphere, oppositely in the S. A cyclone is meteorologically a "storm," but it varies through all degrees of gentleness and severity. An anticyclone is a storm in which the winds tend away from a common center. They usually follow cyclones, and bring in fair weather.

Cy'clops, in classic mythology, one of a generation of giant monsters having each one eye in the middle of the forehead. According to Hesiod, the Cyclopes were the sons of Uranus and Ge (Heaven and Earth), and were three in number, named Brontes, Arges, and Steropes.



CYCLOPS.

Homer represents them as gigantic and lawless shepherds and cannibals who lived in Sicily, the most storied of whom was Polyphemus. CYCLOPS, also a genus of *Entomostraca*, having a shrimplike body, and its two eyes united in the middle line, whence its name; abundant in fresh water.

Cyd'nus, a river of Cilicia, flowing through the city of Tarsus into the Mediterranean. It was celebrated for the clearness and coldness of its water. It was anciently navigable up to Tarsus (12 m.), but its mouth is now obstructed by bars. This river was the scene of Cleopatra's celebrated voyage to meet Antony in 41 B.C.

Cygnus (sĭg'nŭs), "the Swan," constellation of the N. hemisphere in the Milky Way, between Lyra and Cassiopeia; comprises several bright stars, five of which form a cross.

Cyl'inder, in geometry, a solid bounded by two equal and parallel circles or ellipses, forming its bases, and a curve surface generated by the motion of a straight line, called the *generatrix*, which moves around the circumference of the bases so as to remain always parallel to itself. If the generatrix is perpendicular to the bases, the cylinder is right; if not, it is oblique. It is called *circular* or *elliptic*, according to the figure of the bases. A noteworthy property of this solid is that its contents are to those of the inscribed ellipsoid in the ratio of three to two, a property discovered by Archimedes in the special case when the cylinder circumscribed a sphere. The volume of a cylinder is equal to the area of one base multiplied by the distance between bases.

Cym'bal, brass musical instrument, circular in form and about 8 in. in diameter. Cymbals are played in pairs by striking one against the other, and produce a loud, harsh sound of no fixed pitch. The best are those made in China and Turkey. Cymbals were employed by the Greeks in the festivals of Bacchus and Cybele.

Cyme (sīm), a flat-topped or convex inflorescence, or flowering, in which the central flower of each cluster or division opens first, that flower terminating the axis. Linnæus restricted the name to compound inflorescence of this sort, of which the elder (*Sambucus*) and *Viburnum* offer well-marked examples; but modern botanists, making the distinction between flowers from axillary and from terminal buds, employ it as a general term for all forms of inflorescence of the latter kind.

Cymry (kĭm'rĭ), same as KYMRY (*q.v.*).

Cynics (sĭn'ĭks), sect of philosophers among the Greeks, so called from their rating mankind by its lower nature on a level with dogs; and known for their resulting disregard of the conventional usages of society. The professed aim of this school was to inculcate the love of rigid virtue and a contempt of pleasure. It was founded in the fifth century B.C. by Antisthenes, a disciple of Socrates.

Cynthia'na, capital of Harrison Co., Ky.; on the S. Fork of the Licking River; 66 m. S. of Cincinnati; is noted for "Bourbon" whisky; a Confederate force of 2,200, with artillery, under Gen. J. H. Morgan, attacked the city, July 17, 1862, garrisoned by 350 Federal soldiers. It was surrendered, but not till the ammunition was exhausted. On June 11, 1864, Morgan with a large force attacked the place again, and after two days' fighting captured Gen. Hobson with some 1,700 men. On the 14th, Gen. Burbridge, with 7,000 men, fell upon Morgan (whose men were out of ammunition and exhausted), and drove him out of Cynthiana with considerable loss. Pop. (1900) 3,257.

Cy'press, a genus of evergreen trees and shrubs of the pine family. About a dozen species are known, natives of temperate Asia, S. Europe, W. N. America, and Mexico. The best known species is the cypress of the Old World, an upright, narrow, tapering tree with erect branches and a dark-green foliage. It is hardy in the S. U. S. and the S. of England. The Monterey cypress, of California, is a more spreading tree, of rapid growth and greater hardiness. It is one of the finest of the cy-

presses. Cypress wood is very durable, and specimens are known which are said to be several thousand years old. The deciduous, or bald, cypress of the swamps of the S. U. S. is



EVERGREEN CYPRESS.

a tall tree with spreading branches, which bear linear, deciduous leaves. Its wood is soft but durable, and the tree is much planted for timber and ornamental purposes.

Cyp'rian, Saint, more fully, THASCIUS CÆCILIUS CYPRIANUS, abt. 200–258 A.D.; Bishop of Carthage, and one of the Fathers of the Latin Church; native of Africa; a teacher of rhetoric before his conversion; chosen Bishop of Carthage, 248 A.D.; retired to the desert to escape from the persecution ordered by the Emperor Decius, 250; suffered martyrdom under Valerian, by beheading; eminent for his learning, eloquence, and zeal, wisely tempered with moderation.

Cypripedium (sĭp-rĭ-pē'dĭ-ŭm), a genus of plants of the family *Orchidaceæ*; has two lateral and perfect anthers and another forming a dilated fleshy appendage above the stigma; the lip, or labellum, is large and somewhat slipper shaped, hence the popular name lady's slipper. About forty species are known, ranging from the tropics to the colder regions of the N. hemisphere, and often found in bogs or in hilly woods. Eight or nine species are indigenous in the U. S., the most common being *C. acaule,* the moccasin flower. The largest species, *C. spectabile,* is often 2 ft. high.

Cy'prus, island of Asia, in the NE. corner of the Mediterranean; 44 m. S. of Cape Anamoor in Anatolia (Asia Minor), and about the same distance W. of the coast of Syria; about 140 m. long, and 50 m. broad at the widest part; area, 3,584 sq. m.; staple products, cotton, wheat, linseed, olives, silk; also grapes and other fruits. Wine of good quality is also made. In ancient times Cyprus was devoted to the worship of Aphrodite or Venus, who was fabled to have here risen from the sea. Her temple was at Old Paphos, now called Kuklia. The original occupants of the island were probably the Japhetic Kittim (Gen. x, 4), who left their name in the old capital, Citium. Cyprus, scarcely ever for any long time independent, was held by the Phœnicians from abt. 1100 to 725 B.C.; by the Assyrians from abt. 700 to 650; by the Egyptians from abt. 550 to 525; by the Persians from 525 to 333; and then, after 323, by the Ptolemies till 58 B.C., when it became a Roman province. In 44 A.D. it was visited by Paul in his first missionary tour. The Saracens (from 649 A.D.) took and retook it several times. Wrested from the Saracens by Richard Cœur de Lion, 1191, it was governed by kings of its own from 1192 to 1489, and belonged to Venice from that time till 1573, when it was conquered by the Turks. In 1878 the island was ceded to England in consideration of an annual payment to the Sublime Porte (Turkish Govt.) of £92,800. (See BERLIN, TREATY OF.) In 1882 a constitution, with an elected council, was granted to Cyprus. Perhaps no country on the globe has changed masters so many times, or holds within its bosom the relics of so many civilizations. Pop. (1901) 237,022.

Cyrene (sī-rē'nē), capital of Cyrenaica; situated about 10 m. from the Mediterranean, and 1,800 ft. above the level of the sea. It was founded abt. 631 B.C. by a colony of Spartans. Cyrene carried on an extensive commerce with Egypt and Greece through its port called Apollonia. The site is now occupied by *Grenne* or *Kurin.*

Cy'rus the Eld'er, surnamed THE GREAT, d. 529 B.C.; Persian monarch; fourth in descent from the first King of Ansan (or Elam), the mountainous country E. of Babylonia; in the early part of his reign defeated Astyages, King of Media, and took his capital, Ekbatana; in 549–46 obtained possession of Persia, and thereafter styled himself "King of Persia"; conquered Lydia, 540, and Babylon, 538, becoming supreme ruler from the Mediterranean to the mountains of Hindustan; d. on a military expedition, leaving two sons, Cambyses, who succeeded him, and Smerdis. Among his exploits was the capture of Babylon by diverting the Euphrates from its channel while Belshazzar was feasting.

Cyrus the Young'er, abt. 424–1 B.C.; Satrap of Lydia and Phrygia; second son of Darius II Nothus, King of Persia; collected a large native army and hired 13,000 Greek mercenaries, among whom was Xenophon, the historian, and led these forces against his elder brother, Artaxerxes Mnemon (who had succeeded his father as king), but perished in battle at Cunaxa. The retreat of the mercenaries is immortalized in Xenophon's "Anabasis."

Czar (zär), in Russian **Tsar,** title of the emperors of Russia. As early as the twelfth century this title was given by the Russian annalists to Grand Duke Vladimir and his successors, but it was not officially used till the sixteenth century. The title "czarowitz" was introduced, 1709, by Paul I, who bestowed it on his second son, and the titles "czarowitz" and "czarevna" are still applied to the heir apparent and his wife. In Russia the popular appellation of the sovereign is *Gosudar* (*hospo-*

dar, "lord"). The term "white czar" is one of great antiquity, and signifies an independent czar.

Czaslau (chäs'lōw), town of Bohemia; 40 m. ESE. of Prague; has manufactures of beet sugar and spirits, a museum of antiquities, and a monument to John Ziska, the Hussite leader. At Chotusitz, 2½ m. N. of Czaslau, Frederick the Great defeated the Austrians, May 17, 1742.

Czechs (chĕks), most W. branch of the Slavic family of races; embraces the Bohemians or Czechs proper, the Moravians, and the Slovaks of Hungary and Austria; number 8,000,000; language one of complex grammatical structure, highly inflectional, possessing, like the Greek, a dual number, and an alphabet of forty-two letters.

Czerny (chĕr'nē) **George**, or **Kara George**, "Black George"; 1766–1817; a Servian chief; originally a peasant. He became in 1806 the leader of the Servians, who had revolted against Turkey. He defeated the Turks, captured Belgrade, December, 1806, and liberated Servia, secretly aided by Russia. When Russia, invaded by Napoleon, could no longer support him, Czerny was driven out by the Turks in 1813. Having returned to Servia, he was murdered at the instance of Milosch Obrenovitch.

Czolgosz (chōl'gōsh), **Leon** (1873–1901), anarchist and assassin of President McKinley; b. Detroit, Mich., of Polish parents; became an ironworker; shot McKinley at Buffalo, N. Y., September 6, 1901; tried September 23–24; no witnesses were summoned for him, and he was electrocuted at Auburn State Prison, October 29, 1901.

D

D, the fourth letter of the English alphabet; derived through the Roman alphabet from that of Chalcis in Eubœa. The Greek name of the symbol, *delta*, is a mere transference of the old Semitic name, Hebrew *daleth*, door, which combined with the initial use of the sound an indication of the shape. The sound which it indicates in English, and commonly in other languages, is the dental (lingual) voiced explosive, involving a complete check of voiced breath by a closure of the tip of the tongue with the roof of the mouth near the front upper teeth, as in *lad*, or in *dog*. The French *d* differs from the English in that a narrower surface both of the tongue and the roof of the mouth is covered in the articulation. The North German *d* is intermediate between the English and the French. Spanish *d* and the *d* of Irish-English is strongly dental. In modern Greek ð indicates the interdental voiced spirant —*i.e.*, the *th* in English *then*. See ABBREVIATIONS.

D, a note in music, the nominal of the second tone in the model major scale of C.

Dab, small, flat fish belonging to the *Pleuronectidæ* or flounder family. It is common on the more sandy coasts of Great Britain. The rusty dab (*Limanda ferruginea*) is a similar species taken on the New England coast.

Dab'chick, a common name in Great Britain for the little grebe (*Podiceps minor*). See GREBE.

Da ca'po, a musical term, abbreviated D. C.; an instruction to the performer in such airs as end with the first strain to return to the beginning and repeat the first part.

Dac'ca, a division of the province of Bengal, British India. Area, 15,000 sq. m. Pop. abt. 8,800,000. It is subdivided into five districts, one of which is called Dacca. The district of Dacca forms part of the delta of the Ganges and Brahmaputra. Area, 2,797 sq. m. The surface is low and level; the soil is well adapted to the production of rice. The capital, Dacca, is on the Burigangā, 127 m. NE. of Calcutta. At the beginning of the nineteenth century it was a thriving city, but later it lost most of its prosperity. Since 1870, however, its trade and manufactures have revived. It contains several ruined palaces, 180 mosques, 119 pagodas or Hindu temples, a government college, several schools, and a large hospital. It has manufactures of fine muslins, cotton cloth, embroidery, pottery, and silver work. Pop. (1900) 90,542.

Dace, small fish of the carp family, common in the streams of W. Europe. It has a stout, round body, covered with good-sized scales. The back is bluish, sides and under parts white,



DACE.

more or less silvery. It rarely reaches a pound in weight, and is not very good eating, but as it goes in schools, is abundant, and rises to a fly, it is nevertheless popular with local anglers. The dace has numerous relatives in Europe and the U. S., among them the horned dace, *Semotilus corporalis*, of the Middle States.

Dace'lo, a genus of Australian kingfishers, of which several species have been observed. Of these, the best known is the *Dacelo gigas*, or laughing jackass, a large and handsome bird of New S. Wales. It takes its popular

name from its harsh, dissonant cry, which resembles the so-called laugh of the hyena, and is not altogether unlike the bray of the ass. This cry is uttered at early dawn. The bird inhabits hollow trees, and feeds upon fish, reptiles, insects, etc.



DACELO GIGAS, OR LAUGHING JACKASS.

Dachshund (däks'-hŏnt), also called BADGER DOG, from being employed in unearthing that animal; a breed of long-bodied, short-legged dogs, with crooked forelegs. The hind quarters should be higher than the fore, the elbow and fore-foot should point outward, the wrist inward. The color may be black and tan, dark brown, golden brown, or gray of various shades. Weight, 10 to 28 lbs.

Da'cia, former country of Europe; occupied by the Daci, a warlike people; was bounded on the N. by the Carpathian Mountains, and on the S. by the Danube. Trajan reduced Dacia to a Roman province, 106 A.D. It remained under Roman masters till the time of Aurelian (270–275), when the Romans withdrew within the Danube, leaving the country to the Goths. This province comprised the E. part of Hungary, Transylvania, Moldavia, and Wallachia.

Dacier (dä-sē-ā'), **Anne Lefèvre**, 1654–1720; French classical scholar; b. Saumur; became a resident of Paris, 1672, employed by the Duke of Montausier to edit several Latin authors for the use of the dauphin; married to André Dacier, librarian of the king, the translator of Plutarch, and editor of the Delphin Horace, etc., 1683; published French translations of Anacreon, of Terence, of Homer's "Iliad," and "Odyssey"; as an enthusiastic admirer of Homer and other ancient poets became engaged in a famous controversy with La Motte, and wrote her "Traité de Cause de la Corruption du Goût."

Dac'tyl, a metrical foot in Greek and Latin poetry, consisting of a long and two short syllables, as *cārminā*. The term is also applied in the English and in other languages to a foot or measure consisting of one stressed and two unstressed syllables, as *de'stiny*. The *light* or *irritational dactyl* has the same representation in syllables, but its value in time is only that of the trochee, so that the three syllables of the one are pronounced in the same time as the two syllables of the other.

Dactylol'ogy. See DEAF-MUTES.

Dad'dy long'legs, long-legged, spiderlike insects; also known as harvestmen. In England crane flies are called daddy longlegs.

Da'do, the cubical portion of a pedestal comprised between its base and cap. Also a broad band of wainscoting, marble, painting, or the like, decorating the lower part of a wall.

Dæd'alus, Greek mythology, an inventor and mechanical genius; the reputed inventor of the auger, saw, and other tools; built the Labyrinth of Crete, and fabricated wings with which he flew from Crete to Sicily; the father of Icarus. The inventions ascribed to him are partly artistic, also such as the opening of the eyes and extending of the hands in statuary.

Daf'fodil. See NARCISSUS.

Daghestan (dä-gĕs-tän'), province of Russia; extends along the W. coast of the Caspian Sea; bounded SW. by the Caucasus Mountains; surface generally mountainous; area, 11,471 sq. m.; pop. (1897) 587,326; chief town, Derbend; country belonged to Persia until 1812, when it was ceded to Russia, but the Russian rule was not fully established until the submission of Schamyl, 1859.

Dagnan-Bouveret (dăn-yŏñ'-bō-vĕh-rā'), **Pascal Adolphe Jean**, 1852– ; French genre painter; b. Paris; one of the great artists of the contemporary French school; works include "An Accident," "The Parental Blessing" (on a young couple before marriage), perhaps the finest of all his works; "The Consecrated Bread" (Luxembourg Gallery); "Breton Women at the Pardon," "In the Forest," "Hamlet and the Gravediggers," etc.

Dagobert (dä-gō-bār') **I**, abt. 602–638 A.D.; Merovingian King of France; succeeded his father, Clotaire II, 628; elected King of Austrasia, 622; King of Neustria, 628, after the death of his father, and to these two kingdoms added that of Aquitaine after the death of his brother, Charibert, 631. One of his greatest acts was a codification of the Frankish laws. Before his death he was compelled to place his son Sigebert on the throne of Austrasia; left two sons, Sigebert, King of Austrasia, and Clovis II of Neustria.

Da'gon, national god of the Philistines; human down to the waist, with the tail of a fish; embodying the idea of fertility. Its chief temples were at Gaza (destroyed by Samson) and at Ashdod, where the idol was miraculously mutilated (1 Sam. v, 2–4).

Daguerre (dä-gār'), **Louis Jacques Mandé**, 1789–1851; French inventor; b. Cormeilles; became a skillful scene painter, and was one of the inventors of the diorama; succeeded, 1839, in forming indelible images on metallic plates by the chemical action of light, and later improved the process (the daguerreotype).

Daguerre'otype. See PHOTOGRAPHY.

Dahl'gren, John Adolf, 1809–70; American naval officer; b. Philadelphia; midshipman, 1826; captain, 1862; rear admiral, 1863; assigned to ordnance duty in Washington, 1847; invented the Dahlgren gun and a rifled cannon for naval warfare, and brought into use bronze howitzers of 12- and 24-lb. caliber; chief of Bureau of Ordnance, 1862–63; commander of S. Atlantic blockading squadron,

1683–65; silenced Fort Sumter, but failed to capture Charleston; aided in capture of Savannah; commandant Washington Navy Yard, 1868–70; author of "System of Boat Armament," "Shells and Shell Guns," etc.

Dah'lia, genus of plants of the Composite family; natives of Mexico; the numerous varieties cultivated are chiefly derived from two



DAHLIA.

species—*D. coccinea* and *D. variabilis.* Dahlias have varied and exquisite colors. Their tuberous roots, although not agreeable in taste, are used as food in Mexico.

Daho'mey, French colony on the Slave Coast, W. Africa, between German Togoland on the W. and the British possessions of Lagos and Nigeria on the E.; extends N. to the French Military Territories; acquired, 1851–94; area, 60,000 sq. m. Pop. (1900) abt. 1,000,000; chief imports, cotton, machinery, liquors, tobacco; chief exports, palm kernels and palm oil.

Daimio (dī'myō), literally, great name; title of the feudal barons of Japan before the abolition of the feudal system, 1868–71. These were all vassals of the mikado, but during the Tokugawa shogunate they gradually became subject to the shogun, who compelled them to live in the capital with their families and a large number of their retainers for at least six months every year. Each exercised independent authority, and kept large numbers of samurai or armed retainers, to be placed at the service of the mikado when needed. In 1871 the daimios surrendered their lands and privileges to the mikado, who relieved them of the support of the samurai and granted each a pension proportionate to his former revenue.

Dai'sy, small perennial plant of the Composite family; a native of Europe; the species *Bellis perennis* is common in Great Britain, where its delicate, crimson-tipped flower has been sung by poets as the emblem of love and fidelity. The term daisy is also loosely applied to various composite flowers. The ox-eye daisy, or marguerite, a native of Europe, is a



OX-EYE DAISY. (Chrysanthemum leucanthemum.)

wild chrysanthemum; is extensively naturalized in the U. S.

Dakoits', armed gangs of robbers who go about in India and Burma plundering travelers and villages. Dakoity, as their practices are called, was formerly very common, but has almost disappeared in British India, owing to active measures for its suppression.

Dakota Forma'tion, in geology, a group of rocks belonging to the American Cretaceous period; first described in territory of the Dakota Indians. Its characteristic beds are of coarse yellowish sandstone, but shales are frequently associated with these. It exhibits a nearly continuous outcrop along the W. border of the Great Plains from Texas to Alberta, and appears also at many points in the E. portion of the plains, being overlaid in the interval by more recent Cretaceous formations.

Dakota or **James Riv'er,** river of the U. S.; rises in the NE. part of N. Dakota; flows nearly S., and enters the Missouri about 8 m. below Yankton; length estimated at 600 m.

Dakotas, tribe of N. American Indians, constituting the largest division of the Siouan family; mentioned in the Jesuit "Relation" for 1640; were very numerous in the seventeenth and eighteenth centuries, roaming over extensive hunting grounds in parts of the present Dakota states. Their language has been regarded as approaching the Mongolian more closely than any other American tongue. During the wars of the Revolution and 1812–15 they sided with the English, but signed peace with the U. S., 1815. They have had three outbreaks or risings; a portion under Little Crow attacked the whites in Minnesota, 1862; the discovery of gold in the Black Hills led to a general war in which Sitting Bull and other noted chiefs took part, and Gen. Custer was killed, 1876, and a ghost-dance craze broke out, 1890–91. The total number of those speaking the Dakota language is now abt. 28,780, scattered among several agencies.

Dalecarlia (dă-lē-kär'lē-ă), former province of Sweden, now forming the *län* of Kopparberg; area, 11,522 sq. m.; pop. (1905) 221,987; famous for its beautiful mountain scenery, its forests of pine, and its mines of iron and copper. The Dalecarlians are a brave and patriotic people, and as a reward for their fidelity they all have the privilege of taking the hand of the King of Sweden when they meet him.

Daleites (dăl'īts), body of Scotch Independents who were Calvinists and followers of David Dale (1739–1806), a benevolent manufacturer, the father-in-law of Robert Owen. The Daleites became affiliated with the Sandemanians for a time, but later were Independents.

D'Alembert (dă-läṅ-bār'), **Jean Le Rond.** See ALEMBERT.

Dalhousie (dăl-hō'zĭ), **James Andrew Ramsay** (tenth Earl and first Marquis of), 1812–60; British statesman; b. near Edinburgh; son of the ninth earl; entered Parliament, 1837; President of the Board of Trade, 1845–47; Governor General of India, 1847–56; contributed to produce the mutiny of 1857 by his aggressive policy; annexed Pegu, Oude, the Punjab, and Berar; developed the resources of India by canals and other public works.

Dalhousie Univer'sity, at Halifax, Nova Scotia; founded, 1820, by the Rt. Hon. George Ramsay, ninth Earl of Dalhousie. After unsuccessful efforts, in 1822–24 and 1829–36, on the part of both the British Govt. and the Board of Governors, to effect a union with King's College, then the only other existing in the province, Dalhousie College went into operation in 1838. In 1841 an act was passed conferring university powers upon the college. There are faculties of Arts, Science, Law, Medicine, and a School of Mines. The number of books in the library is about 14,500. There are nearly 500 students.

Dalin (dă'lĭn), **Olof** von, 1708–63; Swedish poet and historian; b. Winberga, Holland; royal librarian, 1737; ennobled, 1751; appointed Privy Councilor, 1753; published anonymously, 1733–34, a weekly paper *The Swedish Argus*; works include a "History of Sweden"; an epic, "Swedish Freedom"; a tragedy, "Brynhilda"; a comedy, "The Envious Man."

Dal'las, Alexander James, 1759–1817; American statesman; b. Jamaica; emigrated, 1783, to Philadelphia, where he practiced law; was U. S. District Attorney, 1801–14; Secretary of the Treasury, 1814–16; also Secretary of War, 1815–16. Under him a new national bank was established, and the public credit restored; published four volumes of law reports, "Features of Jay's Treaty," and "Causes and Character of the War of 1812–15."

Dallas, George Mifflin, 1792–1864; U. S. statesman; b. Philadelphia; admitted to bar, 1813; supported Jackson as candidate for office of President, 1824 and 1828; elected to Senate, 1831; minister to St. Petersburg, 1837; elected Vice-President of the U. S., 1844, when Polk was chosen President; minister to England, 1856. Many of his speeches were published, and a "Series of Letters from London" appeared after his death.

Dallas, capital of Dallas Co., Tex.; on Trinity River; 315 m. N. of Galveston; seat of the Cathedral of St. Matthew (Protestant Episcopal), Cathedral of the Sacred Heart (Roman Catholic), Dallas Female College (Methodist Episcopal), Male and Female College (Baptist), Ursuline Convent, St. Mary's Orphanage, St. Mary's Institute for Girls, St. Paul's Sanitarium (Episcopal), Oakcliff, and Ursuline colleges, Central Academy, separate high schools for white and colored youth, Texas State Fair and Dallas Exposition grounds and buildings, and U. S. courthouse. The city is in the center of extensive wheat and cotton belts. Its industries include grain elevators, planing mills, stock yards, cotton compresses, cotton mills, meat packinghouses, and many manufactures, with annual products valued at $15,000,000. Pop. (1906) 52,793.

Dalma'tia, portion of the ancient Illyricum, now the extreme S. province of Sisleithan Austria; a long, narrow tract bounded on the N. by Croatia, on the NE. by Herzegovina, and on the SW. by the Adriatic; includes many islands ; area, 4,940 sq. m.; pop. (1900) 593,784. About ninety-six per cent of the population are Slavic and three per cent Italian. The coast is indented with bays, which form good harbors. The surface is diversified with mountains (the Dinaric Alps), the highest of which, Mt. Orien, rises 6,332 ft. The soil produces wheat, oats, potatoes, maize, wine, and olives. The chief towns are Zara, Spalato, Rogusa, and Cattaro. Dalmatia was conquered by the Romans in the time of Augustus. In the seventh century it was taken by the Slavonians, who founded in it a kingdom which lasted until 1050. In the Middle Ages it belonged to Hungary. In the fifteenth century it fell under the power of the Venetians, who ceded it to Austria, 1797. In 1805 Napoleon annexed it to the kingdom of Italy, and in 1810 to the kingdom of Illyria. It reverted to Austria, 1814.

Dalmat'ica, garment with sleeves, mentioned by Roman authors as in use in the second and third centuries A.D., and named in an edict of Diocletian in the fourth century as worn by both sexes; as an ecclesiastical garment was afterwards adopted by deacons when assisting the priest at the altar; still worn by deacons in the Greek and Roman Catholic churches, though in a different form.

Dal'ny, seaport of Manchuria in the Liaotung Peninsula; at E. terminus of Siberian railway; established, 1899, as a commercial seaport by order of the Czar of Russia; 1901, thrown open to the commerce of all nations. Its harbor is one of the safest and deepest on the Pacific; vessels drawing 30 ft. of water can enter at low tide. Dalny has no customhouse and no customs duties; lowest possible rates charged for tonnage, use of docks, and wharves; is, therefore, most economical shipping port in the East.

Dalri'ada, ancient name of a region in Ireland now known as the "Route," the N. half of the county of Antrim. Some of the race of Riada are said to have settled in Argyle, Scotland, where they founded a petty kingdom called Dalriada. More than twenty kings of this line in Scotland are mentioned before the Dalriads (or Scots) and the Picts became united under Kenneth McAlpine, who became the first "King of Albany." The region S. of the Irish Dalriada was called Dalaradia, probably from another chieftain who governed it.

Dal'rymple. See STAIR, EARLS OF.

Dal'ton, John, 1766–1844; English chemist; author of the atomic theory; b. Eaglesfield, Cumberland; son of a Quaker weaver; taught and lectured on physical science, and resided in Manchester; in 1802 announced his important theory of the constitution of mixed gases; explained the laws of combining proportions and the atomic theory in the first volume of his "New System of Chemical Philosophy."

Dalton, capital of Whitfield Co., Ga.; 40 m. SSE. of Chattanooga; was an important strategical position during the last year of the Civil War; Confederate headquarters under Gen. J. E. Johnston spring of 1864; several battles occurred near by; has a large trade in cotton, grain, fruit, etc., manufactures of cotton, wood, iron, and leather, and is surrounded by large mineral fields of iron, manganese, and limestone. Pop. (1900) 4,315.

Dal'tonism, inability to distinguish colors; so called because John Dalton and his brothers had a defect in vision, in consequence of which red, blue, and green appeared alike. See COLOR BLINDNESS.

Dam, a bank or mole of earth, or a structure of wood, masonry, or the like, built across a stream of water so as to obstruct its flow and raise its level. Dams are designed for the purpose of creating a reservoir, or of securing a head of water to be converted into power. See IRRIGATION.

Dam'ages, in modern law, the estimated equivalent in money, of detriment or injury sustained; specifically, such equivalent as decided by a court or jury in a legal proceeding. The right to damages is peculiar to the common law, as distinguished from equity, the latter aiming to give specific relief by enforcing the performance of the thing agreed to be done, executing trusts, compelling the giving of testimony, etc., but generally refraining from awarding pecuniary damages. The end accomplished by an action at common law, is a judgment awarding money damages to the party injured, as by breach of contract or tort.

Among the systems of the more primitive races, where the reference of values to a money standard has not become thoroughly established, damages are given more or less in kind or in some chattel representing a rough standard of value. Numerous instances of this occur in the laws of the Pentateuch; as in the case of the goring of an ox, where we see an equitable combination of assessment of damages in kind, in the dividing of the dead ox; and in money, in the dividing of the purchase price of the live ox.

In general, the injuries which give rise to a right to damages may be classed as injuries to property, physical injuries, mental injuries, injuries to family relations, injuries to personal liberty, and injuries to reputation; and all of the facts or circumstances which constitute a right of action for damages may be brought under one or more of these heads. The measure of damages is governed by complex rules, difficult both of application and of concise treatment. "Exemplary" or "vindictive" damages are a peculiarly heavy award made in certain cases where the court wishes from motives of public policy to punish a willful wrongdoer as well as to compensate an injured party.

Damar'aland, N. part of the German protectorate of SW. Africa; extending along the coast from the mouth of the Kunene (latitude 18°) S. to Walfish Bay, and E. to the meridian of 21° E., except at the NE. angle, where it extends along the N. parallel to the Zambezi River; area, approximately 200,000 sq. m.; includes Kaokoland and a large part of Ovampoland. The inhabitants form two distinct groups, the Ova-Herero, or Damara of the plains, and the "true Damara," or Damara of the hills. The former number abt. 100,000, and are of pure Bantu stock.

Damascene (dăm-ă-sēn'), **John,** JOHN OF DAMASCUS; also surnamed CHRYSORRHOAS, abt. 700–60; Christian theologian and saint; b. Damascus; was in the service of the caliph; wrote three classical letters in defense of image worship and against the edict of Leo the Isaurian, 727; retired to the monastery of St. Saba, near Jerusalem. His principal work is "The Fount of Knowledge," in three parts: I. "Heads of Philosophy"; II. "Compendium of Heresies"; and III. "An Accurate Summary of the Orthodox Faith." He was the last of the Greek Fathers, and is the most authoritative theologian of the Greek Church; canonized by the Latin and Greek churches.

Damas'cus, city of Asiatic Turkey, in Syria; on a plain at the E. base of the Anti-Libanus; 58 m. ESE. of Beirut. Its magnificent appearance from afar has been celebrated by ancient and modern travelers. Damascus is Oriental in most of its features and characteristics. The city is surrounded by a wall with stately towers and gates, and intersected by the broad street which the Romans called *Via Recta.* The great mosque, 650 ft. in length and 150 in breadth, was built by the Christians, but has been occupied by the Mussulmans since 705 A.D. Damascus has 248 mosques, many with splendid minarets. The huge quadrangular citadel, with massive towers, forms part of the city wall. Several Protestant denominations have schools, as also has the London Jews' Society. There are important manufactures of cotton, silk, and woolen fabrics, jewelry, saddlery, ropes, glass, and arms, including imitation "Damascus

blades." Quantities of flour, grain, and fruits are sent to Beirut and other towns in Syria. Damascus has an extensive trade in European manufactures, tobacco, spices, Eastern rugs and carpets, dates, indigo, coffee, sugar, etc., carried on by means of camels and caravans, with Bagdad, Bassorah, Persia, etc. Here is assembled annually a large number of men of different nations, who start on a pilgrimage to the Kaaba at Mecca. There is a railway line between Damascus and Beirut, and one to Mecca has been projected.

Damascus was a city in the time of Abraham, and merits above Rome the title of "the eternal city." During the time of the Hebrew monarchy it was the capital of Syria. It passed afterwards successively under the dominion of the Assyrians, Babylonians, Persians, Macedonians, Romans, Saracens, by whom it was made the capital of the caliphate of the Ommyiades, 661–750, and Turks in 1516, by whom it was taken. Damascus is one of the sacred cities of the Mohammedans, and has long been known for the fanaticism of its inhabitants. One fourth of the population (estimated 230,000) are Christians, chiefly Greeks. The rest are Mohammedans (Turks, Syrians, Arabs, Druses), with a few thousand Jews.

Damascus Blades, sword blades formerly made at Damascus; famous for their beautifully watered and lined appearance and exquisite temper, which enabled them, when skillfully handled, not only to cut bars of iron, but to divide films of gauze floating in the air. The secret of their manufacture is unknown, but the Russians have produced swords which equal the best Damascus blades in beauty and temper.

Dam'ask, certain rich stuffs of silk and linen or silk and wool; first manufactured at Damascus, whence the trade was carried to Venice, Lyons, and Genoa. The cloth was woven with flowers and regular figures, and sometimes gold was introduced. In modern times a fabric often made of worsted or worsted and cotton mixed is called damask, and is used for furniture coverings, curtains, etc. Damask linen tablecloths are said to have been first imported from France into England in 1575. The peculiarity of damask linen or linen damask is that the pattern is white on white, showing only by the play of light on the threads.

Damaskeen'ing, the ornamenting of steel or iron by inlaying with other metals, such as gold or silver, by means of etching and like processes. This method of ornamentation was formerly much used in Damascus, and is found in modern Persian objects of art. The metal is cut with an engraving tool and the incisions afterwards filled with gold or silver wire. Inferior damaskeening can be produced by the electrotyping process.

Dam'asus I, Saint, abt. 305–84; b. Spain; Bishop of Rome, 366–84; was opposed at the time of election by a rival, Ursinus, whom the Emperor Valentinian refused to recognize; improved the church service by introducing the Psalter; strenuously opposed Arianism; canonized, his day being December 11th.

Dames of the Revolu'tion, patriotic society organized, 1896; composed of women over eighteen years of age, of good moral character, and of proved descent from an ancestor who assisted in establishing American independence.

Damiani (dă-mē-ä'nē), **Pietro,** known as ST. PETER DAMIEN (1007–72); Italian prelate; b. Ravenna; Cardinal Bishop of Ostia, 1057; opposed simony and other corrupt practices of the clergy; was a voluminous writer; took an active share in the political and religious discussions of that day, lived a very ascetic life, and encouraged self-flagellation as a meritorious penance for sins committed; honored as a doctor of the Church.

Da'mianists, sect originating in the sixth century; the followers of Damianus, a Monophysite Patriarch of Alexandria, who taught that the persons of the Trinity are God only in their unity, divinity being divided among them, not that each is God in himself alone. So the godhead of the Father, Son, and Holy Spirit forms one single substance. His adherents were also called Angelites, from their place of meeting in Alexandria, the Angelium.

Da'mien, Fa'ther, popular name of DAMIEN DE VEUSTER, 1840–89; Roman Catholic missionary; b. near Louvain, Belgium; entered holy orders at the age of nineteen; having been sent on a mission to Honolulu, learned of the terrible condition of the lepers, and established himself among them, 1873; was physician, magistrate, carpenter, teacher—everything; died a victim to the disease.

Damiet'ta, town of Lower Egypt; on the E. branch of the Nile; 8 m. from the Mediterranean; founded abt. 1260 some 4 m. S. of the ancient *Tamiathis,* which in the time of the crusades was a strong fortress of the Saracens. The latter was razed and the river blocked, 1251, so that large vessels have not been able to enter the harbor since. The cloth known as dimity was first made here. Pop. (1907) 29,354.

Da'mo, daughter of Pythagoras, to whom he left his memoirs, with strict injunctions not to allow them to pass out of his family. This injunction she obeyed, though in great poverty and tempted with offers of considerable sums of money. She transmitted them to the care of her daughter Bitale.

Dam'ocles, Syracusan parasite and courtier who lived at the court of Dionysius the Elder, and was the subject of this experiment recorded by Cicero: as an antidote to his fond admiration of regal luxury and happiness, the tyrant invited him to a sumptuous banquet, where a sword was suspended by a single hair directly over his head.

Da'mon and Pyth'ias, Syracusans, followers of Pythagoras, noted for their friendship. Pythias having been condemned to death by Dionysius I, tyrant of Syracuse, was at his own request permitted to return to his home

to settle his affairs, Damon pledging his own liberty and life for his return. Pythias returned just in time to save Damon from death, and Dionysius, charmed with such fidelity, not only pardoned Pythias, but asked to share their friendship.

Dam'ophon, sculptor of Messene; flourished abt. 375 B.C.; adorned Ægium, Messene, and Megalopolis with his works, chiefly statues of Parian marble and of wood. Pausanias mentions among the most important a statue of Lucina, one of Æsculapius, of the Mother of the Gods, of Mercury, and of Venus.

Damophyle (dă-mŏf'ĭ-lē), flourished abt. 610 B.C.; Greek lyric poetess; b. Pamphylia; pupil and follower of Sappho; wrote love poems and hymns to Artemis, none of them now extant.

Dampier (dăm'pēr), **William,** 1652–1715; English freebooter, circumnavigator, and author; b. near Yeovil, Somerset; served as a sailor; led a vagrant life in Jamaica and Mexico; joined a party of buccaneers abt. 1679, and with them sacked Spanish towns on the Pacific coast of Central and S. America and captured vessels; made his way around Cape Horn to Virginia; joined another freebooting expedition, which eventually took him to the E. Indies; went on trading and piratical voyages to China, India, etc.; returned to England, 1691; published "Voyage Round the World"; given command of a government expedition, 1699, which explored the coasts of Brazil, Australia, etc.; engaged in privateering, 1703–7, 1708–11; wrote a valuable "Discourse on the Winds."

Dampier Archipel'ago, group of islands near the NW. coast of Australia; comprises Rosemary, Lewis, and other islands; Dampier Island, near the NE. coast of New Guinea, with a volcano over 5,000 ft. high, belongs to Germany.

Dam'son Plum. See PLUM.

Dan, son of the Hebrew patriarch Jacob and Bilhah, Rachel's maid, and the founder of one of the twelve tribes; also the part of Palestine occupied by the tribe of Dan, bounded on the W. by the Mediterranean. It contained seventeeen cities, the chief of which was Joppa. Dan (or Laish) was an ancient city in the extreme N. part of the Promised Land, and was laid waste by Benhadad.

Dan, river of Virginia and N. Carolina; rises in the S. part of Virginia, flows generally E., and crosses the boundary between those states five or six times; after a course of about 200 m. unites with Staunton River at Clarksville, Va. Below this junction the stream is called the Roanoke.

Da'na, Charles Anderson, 1819–97; American journalist; b. Hinsdale, N. H.; joined the Brook Farm Association, 1842; edited the *Harbinger,* a journal devoted to the interests of Fourierism; a contributor to the Boston *Chronotype*; connected with the New York *Tribune,* 1847–62; the connection ended in consequence of a disagreement with Horace Greeley, the editor, arising from Dana's attitude toward the war as revealed in his famous editorial articles "On to Richmond!" Assistant Secretary of War, 1863–64; afterwards edited a new Republican paper in Chicago; returned to New York and participated in the purchase of the New York *Sun*; was its chief editor from 1868 till his death; edited "The Household Book of Poetry," and in connection with George Ripley "The American Cyclopædia."

Dana, Francis, 1743–1811; American statesman and jurist; b. Charlestown, Mass.; son of Judge Richard Dana; admitted to the bar, 1767; joined the Sons of Liberty; a member of the Council of Massachusetts, 1776; delegate to the congresses of 1777 and 1778; minister to Russia, 1780; Judge of the Supreme Court of Massachusetts, 1785; Chief Justice, 1791–1806; voted for the Constitution as a member of the state convention convened to ratify it, 1788; in politics was a Federalist.

Dan'aë, in classical mythology, a daughter of Acrisius, King of Argos, who confined her in a brazen tower because an oracle had predicted that her son would kill her father; became the mother of Perseus, whose father, Zeus or Jupiter, obtained access to her in the form of a shower of gold.



DANAË.

Dana'ides, name of the fifty daughters of Danaüs, a mythical king of Egypt, who were married to fifty sons of Ægyptus, their uncle. By order of their father, who had been warned by an oracle that he would be slain by one of his sons-in-law, each of the Danaïdes, except one, Hypermnestra, killed her bridegroom on the wedding night. Polyxena, another of the sisters, killed Ægyptus, as well as his son, her husband. The Danaïdes were doomed in Tartarus to pour water forever into a vessel perforated with holes.

Da'nakil, Abyssinian tribe occupying an area bounded NE. by the Red Sea and SW. by a range of mountains; and about 250 m. long. This land also is named Danakil. Its climate is hot and soil poor. The inhabitants are ferocious, treacherous, and fanatical Mohammedans; number abt. 70,000, and form a part of the Italian colony of Eritrea.

Dan'aüs, Greek mythology, the son of Belus, King of Egypt, who by some is supposed to be Neptune (Poseidon), and twin brother of Ægyptus. After the death of Belus, Danaüs and Ægyptus ruled over Egypt, but, in consequence of a difference between them, Danaüs set sail with his fifty daughters to find a new home. He settled in Argus, whose king, Gelanor, he succeeded in dethroning, and established the dynasty of the Belides. Ægyptus, jealous of his brother's prosperity, followed him to Argos with his fifty sons, who under pretense of friendship sought the hands of their cousins in marriage. See DANAÏDES.

Dan'bury, one of the capitals of Fairfield Co., Conn.; 62 m. NE. of New York City; has the largest manufactures of hats in the U. S., and a considerable production of iron and brass goods, silverware, bicycles, paper, shoes, shirts, and boxes. The U. S. Census of 1905 reported 103 factories, with capital $4,037,159, and products valued at $8,065,652. Danbury was settled, 1684; made a depository for army stores, 1776; and burned with the stores by the British governor of New York, 1777. Pop. (1906) 16,537.

Dance of Death, mediæval religious dance, long a favorite subject of painting and poetry, in which persons of all ranks and ages were represented dancing together, with the skeleton form of Death leading them to the grave. It was a kind of masquerade performed in the churches, in which the characters held dramatic conversations with Death, and disappeared one by one from the scene. Holbein's celebrated series entitled "The Dance of Death" combines fifty-three distinct and most diverse scenes; Death here assumes various ironical costumes, while meeting and overcoming persons in every condition of life.

Dan'cing, succession of rhythmical movements of the body, often accompanied by music; is of very early origin. The ancients constituted it a part of their religious observances, and danced before their altars and the images of their gods. The ancient Egyptians ascribed its invention to their god Thoth. All the different passions were expressed in dancing by the Greeks, and the dance of the Eumenides, or Furies, was so expressive of vengeance that it inspired the beholders with terror. The attitudes of the public dancers were studied by the Greek sculptors in order to delineate the passions. Aristotle ranks dancing with poetry. The Spartans were required to train their children in this art from the age of five. This was done publicly, to train them for the armed dance, and was accompanied by songs or hymns. In ancient times, dancing in private entertainments was performed by professionals. The Romans held it disgraceful for a free citizen to dance except as a religious rite. In Egypt there are dancing and singing girls, who improvise verses and are called *almeh.* In India there are nautch girls, who dance on public occasions. Among savages dancing is still used as a religious rite or as a sort of state ceremony on important occasions.

Dancing Ma'nia, epidemic disorder of the fourteenth, fifteenth, and sixteenth centuries, similar to chorea. It is supposed that much imposture prevailed in many forms of this epidemic, but there were also many cases in which the subject entirely lost control of the will. This disorder is even now known in Abyssinia. Something similar to it in Italy was ascribed to the bite of a spider called the tarantula, but its greatest prevalence was in the cities of Germany during the Middle Ages. At Aix-la-Chapelle, 1374, there appeared on the streets crowds of dancing men and women, apparently excited thereto by the frantic demonstrations at the festival of St. John. The dancers were said to be unobservant of outward things, but sensible of visions. They appeared to lose all self-control, and would dance till they fell as if dead, and would sometimes beat out their brains upon the ground. The mania extended to the Low Countries, as well as Cologne, Metz, and Strassburg, and caused much demoralization. Exorcism was at first found remedial, and cold water, as applied by Paracelsus in the sixteenth century, was very efficacious. At the beginning of the seventeenth century the St. Vitus's Dance, as the disorder was then called, was abating, and is now almost unknown.

Dan'delion, the *Taraxacum officinale,* herbaceous plant of the Composite family, with a perennial spindle-shaped root. The leaves spring immediately from the root, are long, feather shaped, with the divisions toothed, smooth, and of a fine green color. It bears



DANDELION.

single bright yellow flowers on a smooth, hollow stem. The leaves when very young are tender, and are used as a pot herb, and it is cultivated and brought to market for this use. It is a popular remedy in the U. S. and Europe, having gentle tonic powers. The root is sometimes prepared and ground with coffee, the taste of which covers that of the dandelion.

Dan'die Din'mont. See TERRIER.

Dan'dolo, Enrico, 1110–1205; doge of Venice; served the republic in many capacities; became doge, 1192, when over eighty years old and nearly blind; participated in the fourth crusade; conquered Constantinople, June 17, 1203; established the Latin Empire under Baldwin of Flanders, having himself declined the imperial crown; secured to Venice her full share of the spoils, both in provinces and treasure, besides commercial privileges of the greatest importance. The four horses which now adorn the W. front of the Church of St. Mark were among the booty which was carried to Venice.

Dane'gelt, tribute of one shilling levied on every hide (about 100 acres) of land by the Anglo-Saxon and early Norman kings, originally for the purpose of paying the Danes for leaving the country; later increased to two shillings, and though abolished by Edward the Confessor and again by Henry II it reappeared for a time as late as the reign of Richard I.

Dane'law, or **Dane'lag,** name applied under the later Saxon and earlier Norman kings of England to fifteen or more counties of the N. and E. of England, where the Danes were confined by the wars of Alfred the Great; reduced by Edward the Elder (901–925); rose in revolt in the reign of Eldred, but were forced into submission, 954. The word also means the code established by the Danes on their settlement in England.

Dan'enhower, John Wilson, 1849–87; American Arctic explorer; b. Chicago, Ill.; graduated at Annapolis, 1870; commissioned lieutenant, 1879; served on a surveying expedition in the N. Pacific, 1873–74; on the *Vandalia* during ex-Pres. Grant's visit to Egypt and the Levant; joined the Arctic steamer *Jeannette* at Havre, France, making the voyage to San Francisco and into the Arctic Ocean. The vessel was crushed and the crew retreated for ninety-five days over the ice. Danenhower commanded a boat which landed at the Lena Delta, September 17, 1881, and reached the U. S. in June, 1882; author of "The Narrative of the Jeanette," 1882.

Dan'iel, Hebrew prophet; was a youth when he was carried with many other Jewish captives to Babylon, 605 B.C. Whether he was of royal or only of noble descent cannot be determined. He was educated at the court of Nebuchadnezzar, and was eminent for learning and wisdom. His skill in the interpretation of dreams procured for him the favor of the king, who appointed him governor of the province of Babylon and chief of the magi, or priests. He explained the handwriting on the wall at Belshazzar's feast abt. 538 B.C. After the capture of Babylon by the Medes and Persians, Daniel gained the favor of Darius the Mede, and was the first of three presidents who had authority over the 120 satraps (governors of provinces) of the empire. He also "prospered in the reign of Cyrus the Persian," and appears to have remained in Babylon when the other Jews returned to Jerusalem.

Daniel, Hermann Adalbert, 1812–71; German theologian and geographer; b. Köthen; professor at Halle; chief theological works, "Thesaurus Hymnologicus," five volumes, 1841–56, and "Codex Liturgicus Ecclesiæ Universæ," etc., four volumes, 1847–54; best geographical works, "Leitfaden für den Unterricht in der Geographie," sixty-eighth edition, 1872, and "Handbuch der Geographie," third edition, four volumes, 1870–71.

Daniel, Samuel, 1562–1619; English poet; b. Taunton; lived in London, where he associated with Shakespeare and Marlowe, and was employed as tutor to Anne Clifford, afterwards Countess of Pembroke; wrote, besides other poems, "The Tragedy of Cleopatra," 1594, and "On the Civil Wars of York and Lancaster," 1595; and in prose a "Defense of Rhyme," 1602, and a "History of England," 1612–18.

Daniel, Book of, canonical book of the Old Testament, counted in some Christian traditions as one of the four books of the major prophets, but properly classified among the Hagiographa. The book has commonly been divided into two parts, of six chapters each—the first six historical, the last six prophetical. The book is remarkable both for its miracles and its prophecies. The close general correspondence of these prophecies with the recorded facts of history has led some writers to the belief that the book is not the work of Daniel, as it purports to be, but that it was written by some unknown person at a much later period.

Daniell, John Frederick, 1790–1845; English scientist; b. London; Prof. of Chemistry in King's College, London, 1831; inventor of the galvanic battery by which it was possible to maintain a current sensibly constant for a long time, for which he received the Copley medal, 1837; also invented the hygrometer and the pyrometer; published "Introduction to Chemical Philosophy," 1839. His "Meteorological Essays," 1823, constituted the first attempt to explain the phenomena of the weather by physical science.

Dan'ish West In'dies. See WEST INDIES.

Dan'ites, or Destroy'ing An'gels, members of a secret society of Mormons, organized, 1838, and originally comprising about 300 men, who are believed to have taken an oath to support the authority and execute the commands of their leaders at all hazards. Many massacres, robberies, and murders, committed during the early history of Utah, are ascribed to the Danites, but the Mormons assert that these were not countenanced by the "saints." In 1877 John D. Lee, who had belonged to this society, was tried and executed for participation in the massacre of a train of "Gentile" emigrants, 1857.

Dan'nebrog, ancient battle standard of Denmark, bearing the figures of a cross and crown; was fabled to have fallen from heaven at the battle of Volmar in Esthonia (1219) during a crusade against the heathens; twice taken in battle and twice recaptured.

Dan'necker, Johann Heinrich von, 1758–1841; German sculptor; b. near Stuttgart; appointed Prof. of Sculpture at Stuttgart, 1790; produced busts of Schiller, Lavater, and other men of his time. While surpassed by Canova in creative power, he excelled him in æsthetic perception, and thus stands in the history of sculpture between Canova and Thorwaldsen. Among the best productions of the Canova classicism are his "Ariadne," of which the original or a replica is in a private collection in Frankfort, the "Sappho" made for the Duke of Würtemberg, and a colossal statue of Christ.

Dannewerk (dăn'ĕ-vĕrk), boundary wall in Schleswig, built by the Danes against the Franks abt. 808, from the Baltic to the North Sea. The original line can be traced from the town of Schleswig to Hollingstedt. The line of the Dannewerk was restored, 1748, by a system of strong fortifications known as the "Great Dannewerk" and the "Little Dannewerk." They were evacuated by the Danes, February 5, 1864, and destroyed by the allies.

D'Annunzio (dän-nōn'tsĭ-ō), **Gabriele.** See ANNUNZIO.

Dante degli Alighieri (dän'tā dāl'yē ä-lē-gē-ā'rē), 1265–1321; greatest of Italian poets; b. Florence; son of a lawyer; in boyhood conceived a romantic affection for Beatrice Portinari, eight years of age; composed poems in her honor; in his first work, "Vita Nuova" (New Life), celebrated his early love for her and in his "Divina Commedia" (Divine Comedy) related the history of his later regeneration through and by her; was overwhelmed at her death, 1290, but about two years later married Gemma Donati. He is said to have studied at Bologna Univ.; took part with the Florentines in the battle of Compaldino, 1289; enrolled in the Art or Guild of Physicians and Apothecaries, 1295. Began to hold public positions; sat in the Council of One Hundred; was sent on foreign missions; endeavored to reconcile the Guelphs and Ghibellines; chosen one of the six priors of the republic, 1300; and in the strife between the "blacks" and "whites," parties of the Guelphs, intrigued for the former's advantage; later, inclined to the side of the "whites," but when they possessed themselves of the government, was fined, exiled, and condemned to be burned if ever found on Florentine territory. He lived in Verona, Bologna, Padua, and Paris, possibly visited Oxford, and, returning to Italy, wandered from city to city; died in Ravenna. He produced the "Vita Nuova," abt. 1295; the "Convivio," or "Convito" (Banquet), practically a continuation of the former, finished abt. 1307; the "Divina Commedia," which occupied the last years of his life; a treatise on "The Italian Language or Vulgar Idiom," another "Concerning Monarchy," also sonnets and other poems.

Danton (dăn'-tŏn'), **Georges Jacques,** 1759–94; French revolutionist; b. Arcis-sur-Aube; practiced law in Paris; a founder and leader of the club of Cordeliers, the center of the extreme popular party; elected Administrator of the department of Paris, 1791; instigated the insurrection of August, 1792, which began the Reign of Terror; Minister of Justice same month; largely responsible for the "September Massacres"; member of the Convention; joined the Mountain, as the extreme revolutionists were called; voted for the death of the king, 1793; prominent in the establishment of the revolutionary tribunal; member of the Committee of Public Safety; aided in overthrowing the Girondists; was finally overthrown by Robespierre and guillotined.

Dant'zic, or Dan'zig, fortified city and seaport of W. Prussia; on the Vistula; 3½ m. from its entrance into the Baltic; is traversed by the Motlau and Radaune, which here enter the Vistula, and is the terminus of a railway from Berlin, 250 m. to the WSW. Dantzic is surrounded by walls, and defended by a citadel and outworks; contains a fine cathedral, begun, 1343, and finished, 1503; numerous Lutheran and Roman Catholic churches, exchange, town hall, gymnasiums, hospitals; schools of navigation, midwifery, commerce, and arts and trade; observatory, public library, museum, arsenal, and dockyard. The manufactures include beer, spirits, tobacco, sugar, flour, ironware, machinery, and gold and silver ornaments.

Dantzig was founded in the tenth century or earlier; was occupied by the Teutonic Knights, 1310–1454. In 1454 the knights ceded W. Prussia to Poland and Dantzig, with considerable adjacent land; became a free state under the protection of Poland. It was for a long time one of the cities of the Hanseatic League. On the partition of Poland in 1793 it was annexed to Prussia. Dantzig has been twice besieged. The first siege was by the French in 1807, in which the utmost skill of the French engineer and the science of the French artillerist were successfully illustrated. Marshal Lefebvre, the French commander, was created Duke of Dantzig. The second siege was a blockade by the Prussians and Russians in 1813, after Napoleon's disastrous Russian campaign. Gen. Rapp held the place and brilliantly maintained himself until the cessation of hostilities under the armistice concluded between Napoleon, Alexander, and the Prussian King. Pop. (1900) 140,563.

Dan'ube, largest river of Europe next to the Volga; formed by the union at Donaueschingen of two streams, the Brigach and the Brege, which rise in the Black Forest of Baden, at a height of 2,250 ft. It flows through Würtemberg and Bavaria with a NE. course; then turns to the SE. and crosses the boundary of Germany and Austria at Passau, where it is 230 yds. wide. In Bavaria it receives five Alpine rivers—the Lech, Isar, Inn, Altmühl, and Regen. From Lintz to Pressburg in Hungary it takes a generally E. course, receiving the Ens and the Morava; then flows SE. to its junction with the Raab, and E. to Waitzen, whence it flows S. through the great plain of Hungary, receiving on its course the Waag, the Gran, and the Drave. After meeting the latter it flows SE., taking in the Theiss and the Temes; meets the Save at Belgrade, where

it begins to form the boundary between Hungary and Servia; at Semlin, opposite Belgrade, it is 1,700 yds. wide, but farther on it becomes much narrower and very turbulent, being only 129 yds. wide at the passage of the Iron Gate below Orsova, where it leaves Hungary. A canal, cut through and around the obstructions at the Iron Gate, completed, September 27, 1896, opened the upper Danube to large vessels. From Orsova the river flows SE., NE., and N. to Galatz, making a loop of a curve, after which it receives the Pruth and flows E. to the Black Sea. The delta covers an area of 1,000 sq. m., and consists of innumerable lakes and channels. Shipping enters by the Sulina or middle mouth. Improvements at this mouth (1894–05) raised the depth over the bar to 23½ ft., and cuttings have been made with the object of avoiding difficult bends. The total length of the river is about 1,770 m., and it drains over 300,000 sq. m.

Dan'ville, capital of Vermilion Co., Ill.; on Vermilion River; 125 m. S. of Chicago; the seat of one of the National Homes for Disabled Soldiers; largely engaged in mining bituminous coal on the bluffs of the river; and has large railroad car and machine shops, iron foundries, planing and woolen mills, and glass and boiler works. Pop. (1906) 21,794.

Danville, city in Pittsylvania Co., Va.; on the falls of Dan River, which furnish water power; 140 m. SW. of Richmond; is in the noted yellow-tobacco-growing region; has an annual trade in that leaf of over 35,000,000 lbs.; seat of Randolph-Macon Institute (Methodist Episcopal Seminary), Roanoke College for Women (Baptist), Danville Military Institute (nonsectarian), and Danville Female College; has cotton and other mills; chiefly engaged in handling tobacco. Pop. (1906) 17,972.

Daph'ne, in Greek mythology, nymph beloved by Apollo. To escape from him she besought the aid of the earth, which opened to receive her, and she was transformed into a laurel tree.

Daphne, celebrated grove and sanctuary of Apollo, 5 m. SW. of Antioch in Syria; frequented by heathen pilgrims and voluptuaries. Here was a temple of Apollo, surrounded by beautiful groves of laurel and cypress trees, gardens, and baths. This place was the scene of an almost perpetual festival of vice.

Daph'nia, genus of fresh-water *Entomostracans* of the order *Cladocera,* characterized by a bivalve shell, five pairs of feet, and long swimming antennæ. They form an important element in the diet of many fresh-water fishes.

Daph'nis, in Greek mythology, a beautiful youth of Sicily; son of Mercury and a nymph; reared amid groves of laurel, whence his name, and taught by Pan to play on the pipe; became a herdsman on Mt. Ætna, where he won the love of a naiad, who for his supposed unfaithfulness punished him with blindness. He prayed his father for relief, and Mercury transferred him to heaven. The invention of bucolic poetry was ascribed to him. The story of Daphnis forms the subject of the first idyl of Theocritus.

Da Ponte (dä pōn'tā), **Lorenzo,** 1749–1838; Italian poet; b. Venice; Latin Secretary to Emperor Joseph II in Vienna, where he composed several operas. After residing some years in London, emigrated to New York, 1805; appointed Prof. of Italian in Columbia College, abt. 1828; wrote the libretto for Mozart's "Don Giovanni," and other works. Died in New York.

D'Ar'blay, Madame, maiden name, FRANCES BURNEY, 1752–1840; English novelist; b. Lynn-Regis; daughter of Charles Burney, the musician. Her father removed to London, 1760, and his house was frequented by Burke, Johnson, Garrick, and other *literati,* but in these assemblies "Fanny" was a silent and diffident spectator. Her first novel, "Evelina," published anonymously, 1778, had a great success. In 1782 she produced "Cecilia." She was second keeper of the robes to Queen Charlotte, 1786–91, and wrote an interesting account of court experience in her "Diary and Letters," seven volumes, 1842–46. In 1793 she was married to Count d'Arblay, a French exile. Her third novel, "Camilla," 1796, was only a pecuniary success.

Darboy (dăr-bwä'), **Georges,** 1813–71; French ecclesiastic; b. Fayl-Billot; 1839, teacher of Philosophy and Theology at the Seminary of Langres; 1859, Bishop of Nancy; and, 1863 Archbishop of Paris. At the Vatican Council he was a decided opponent of papal infallibility, but recognized it when it was promulgated. April 5, 1871, arrested by the Communists, and with five others was shot at the prison of La Roquette. Among his prominent works are "Les saintes femmes," 1850; "Les femmes de la Bible," 1849, two volumes; "La vie de St. Thomas à Becket," two volumes, 1860.

Darcet (dăr-sā'), **Jean Pierre Joseph,** 1777–1844; French chemist; b. Paris; added several useful discoveries to practical chemistry, important improvements in the making of gunpowder, the composition of bronze and steel, the production of soda from common salt, etc.

Dardanelles' (ancient *Hellespontus*), called also the STRAIT OF GALLIPOLI, narrow channel connecting the Sea of Marmora with the Ægean, and separating the peninsula of Gallipoli from Asia Minor; length, 45 m.; average width, 3 to 4 m.; it is of great strategic importance; considered the key to Constantinople, and is defended by forts at Tchanak-Kalessi on the Asiatic side and at Kilid-Bahr on the European side, and by other forts at the entrance of the Ægean Sea. It was crossed by Xerxes, 480 B.C., with floating bridges, and again by Alexander, 334 B.C. The Dardanelles is closed to foreign ships of war by a stipulation, 1878, but an agreement between Turkey and Russia, 1891, has permitted free passage to the volunteer fleet of Russia.

Dare, Virginia, b. 1587; first child born of English parents in America; b. Roanoke, Va.; granddaughter of Gov. John White and daugh-

ter of a member of his official staff; named after the district of Virginia. Soon after her birth her grandfather, who had come to America to establish a colony, returned to England, and in the following year, on his return, could learn nothing of colony or child.

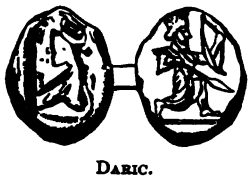
Da'res, Trojan, companion of Æneas; distinguished for his skill in boxing. At the games in honor of Anchises in Sicily, Dares challenged all competitors, but was defeated and nearly slain by the aged Entellus.

Dar-es-Salaam (där-ĕs-säl-ăm'), capital of German E. Africa, on the coast nearly opposite the S. point of Zanzibar. Pop. (1906) 24,000. See GERMAN E. AFRICA.

Dar Fertit', Arab name of a large district in E. Africa, S. of Dorfur and Kordofan, watered by the Bahr-el-Abiad; has been the prey of slave hunters since 1820; naturally rich in ivory, rubber, and other resources, but almost an uninhabited wilderness; region claimed by Khedive of Egypt; chief settlement, Dem Siber, the "Dem" indicating a fortified slave station.

Darfur (där'fôr), country of central Africa; in the E. part of Sudan; area, about 200,000 sq. m.; pop. (est.) 1,500,000; crossed by a range of mountains called Marra; fertile in the rainy season, with the exception of the N. part. The people, a mixture of Arabs and Negroes, are Mohammedans. Darfur trades with Egypt by caravans, and exports ivory, copper, hides, and ostrich feathers; is ruled by a sultan who has despotic power and resides at Tindelly; chief commercial town, Kobbe. Darfur is within the sphere of British influence.

Dar'ic, ancient Persian coin of pure gold; believed to be essentially the same as the Greek chyrus and stater and the Roman aureus; value equal to $7 U. S. gold.



DARIC.

Darien', probably the old name of the Atrato River; the first colony of Europeans on the mainland of America after its discovery; Fort of San Sebastian built by Spaniards on E. side of Gulf of Darien, 1509; abandoned 1510, and Santa Maria de la Antigua del Darien founded on W. side of the gulf; Panama, founded 1519, became the capital, and the original town of Darien was abandoned. At Panama the expeditions parted which eventually led to the conquest of Peru, Chile, Charcas, or Bolivia, and New Granada, and on the other side a large part of Central America. Thus Darien was the nucleus from which sprang the great states of Spanish America, except those on the islands (already colonized), Mexico, Venezuela, and the Rio de la Plata.

Darien, or Urab'á, Gulf of, inlet of the Caribbean Sea in the coast of Colombia; at the extreme NW. angle of S. America, between the continent and the Isthmus of Panama; length about 30 m.; average breadth, 7 m.; central part deep, but the shores are lined with shallows, and are low, marshy, and unhealthy; only ports two or three small villages. The Atrato River enters the gulf by several mouths.

Darien, Isth'mus of, as commonly used, same as the Isthmus of Panama; in a more restricted sense, that portion of the Isthmus of Panama which forms a narrow neck between the gulfs of San Miguel and Darien. This part is less favorable to transit than the portion between Panama and Colon.

Darien Scheme, project devised by a Scottish trading company for the establishment of a colony in the Isthmus of Darien which should be an emporium for the world's commerce. In 1698 some 12,000 colonists sailed from Leith, and reached Darien, November 4th. Lack of provisions, sickness, and anarchy worked the ruin of the place, and in spite of reënforcements the enterprise went to pieces, only a handful of survivors ever returning to Scotland.

Dari'us, name of three kings of ancient Persia, who follow: DARIUS I, or DARIUS HYSTASPES; d. 486 B.C.; King of Persia; son of Hystaspes, member of the noble family of Achæmenidæ; called Gushtâsp in the legends of Persia; one of seven noble Persians who conspired against and killed the usurper Smerdis, whom he succeeded, 521 B.C.; married two daughters of Cyrus the Great, and organized the extensive empire which Cyrus and Cambyses had enlarged by conquest; reduced Babylon, which had revolted, 516. He sent a large army to conquer and chastise the Greeks, some of whom had offended him, by aiding the Ionians in their revolt; his army was routed at Marathon, 490 B.C.; was preparing to renew the invasion of Greece when he died; succeeded by his son Xerxes. DARIUS II, called DARIUS OCHUS, or NOTHUS; d. 405 B.C.; King of Persia; natural son of Artaxerxes Longimanus; married Parysatis, his aunt, a daughter of Xerxes I; in 424 B.C. deposed and succeeded the usurper Sogdianus, who had killed Xerxes II, the lawful heir. He had two sons, of whom the younger, Cyrus, is famous; succeeded by his son Artaxerxes Mnemon. DARIUS III (surnamed CODOMANNUS); d. 330 B.C.; last king of the ancient Persian monarchy; descendant of Darius II; ascended the throne, 336 B.C., on the death of Arses. In 334 his empire was invaded by Alexander the Great, who gained a victory at the Granicus. Darius, commanding in person, was defeated at Issus, 333, and again at Gaugamela, near Arbela, 331 B.C.; retreated toward Bactriana, pursued by the victorious army, which had nearly overtaken him when he was murdered by Bessus, one of his satraps.

Dark A'ges, period between the fall of the Roman Empire, in the fifth century A.D., and the revival of learning about the thirteenth century. As this revival occurred earlier in Italy than in N. Europe, the Dark Ages may justly be said to have been of longer duration in the N. than in the S.

Dark and Blood'y Ground, name frequently applied to Kentucky, because the region was the scene of many sanguinary conflicts between

the Indians of the N. and S. tribes. Later the constant feuds between white settlers and the aborigines rendered the phrase appropriate to this locality.

Dark Con'tinent, The, Africa, in allusion to the ignorance which long prevailed concerning the people and geography of its interior.

Dark Day, in particular, May 19, 1780, which was very dark in Connecticut, New York, and New Jersey, causing great alarm. Similar days have occurred from time to time in other places when, as in the case above, the failure of light is not due to solar eclipses. The darkness is sometimes due to fog—as in London—sometimes to an unusual thickening of the clouds, or an abundance of smoke.

Darkhan', high granite mountain range in Mongolia; 140 m. SE. of Urga. Here is a monument erected to the memory of Genghis Khan, to honor whom the Mongolians assemble here annually.

Dar'ley, Felix Octavius Carr, 1822–88; American artist; b. Philadelphia, Pa.; son of John Darley, an actor of English birth; employed by publishing houses in Philadelphia; removed to New York, 1848; published outline illustrations of Judd's "Margaret," Irving's "Legend of Sleepy Hollow," Hawthorne's "Scarlet Letter," and other works; illustrated the novels of Cooper, Simms, and Dickens; Lossing's "History of the U. S.," and other publications; painted a number of pictures depicting scenes in American history; wrote and published "Sketches Abroad with Pen and Pencil."

Dar'ling, Grace Horsley, 1815–42; English heroine; b. Bamborough; daughter of the keeper of the Longstone lighthouse, on one of the Farne Islands; rescued nine persons from the wreck of the steamer *Forfarshire,* September 7, 1838.

Darling, river of New S. Wales; formed by numerous branches which rise on the W. declivity of the Australian Alps. Below the union of these branches the Darling flows SW. through arid plains, and enters the Murray near latitude 34° S. The main stream is 600 m. long.

Darmesteter (därm-stĕ-tā'), **James,** 1849–94; French Orientalist; b. Meurthe; secretary of the Société Asiatique de Paris, 1881; Professor of Iranian Languages, College of France, 1885; works include "Ormazd and Ahriman," "Oriental Studies"; a translation of the Zend-Avesta; married Agnes M. F. Robinson, the poet, who after his death became the wife of Prof. Duclaux, of Paris.

Darm'stadt, capital of the grand duchy of Hesse-Darmstadt; on the Darm; 15 m. S. of Frankfort-on-the-Main; consists of an old and a new town, both surrounded by walls; has five public squares and two ducal palaces, one of which contains a library of 500,000 volumes and a valuable collection of 700 paintings; the other contains Holbein's "Meyer Madonna." There are manufactures of machinery, chemicals, tobacco, hats, playing cards, carpets, and beer. Pop. (1905) 83,123.

Dar'nel, grass of the genus *Lolium,* well known in Europe, and naturalized in the U. S. The common darnel, a fair pasture grass, is found in the E. U. S. The seeds of bearded darnel are reputed poisonous, but recent research is said to have established their harmlessness.

Darn'ley, Henry Stuart (Lord), 1541–67; Scottish nobleman; b. England; son of the Scottish Earl of Lennox. His mother was a niece of Henry VIII of England. In 1565 he married Mary Queen of Scots, whom he soon offended by his insolence and other faults; also procured the assassination of Rizzio, her lover, which act aroused her deepest indignation. The house in which he lodged was blown up with gunpowder at the instance, it was suspected, of his wife, and he was killed.

Dar'ter, aquatic bird related to the cormorants; belongs to order *Steganopodes* and genus *Plotus.* The darters are lightly built, with long neck and tail, and straight, pointed bill. The darters are more common in fresh than salt water. There are but three or four species, found in tropical or warm regions. They live upon fish, which they capture by diving, and they are able to extend the head very rapidly. The darters possess the power of sinking in the water, so that the head and neck alone are visible. The American species is found in N. and S. America, and occurs along the Gulf coast of the U. S. In Florida it is commonly known as snakebird, and occasionally as water turkey.

Dart'moor, granitic plateau in Devon, England; area, 130,000 acres. Hey Tor, one of the crests in the S., is 1,500 ft. high, and Yes Tor, in the N., reaches 2,050 ft. Dartmoor is principally moorland covered with heather, and the central part has been a royal forest since a period prior to the Norman conquest. The forest was granted by Henry III to his brother Richard, Earl of Cornwall, and since 1337 a part of Dartmoor has belonged to the duchy, though not to the county of Cornwall. Dartmoor is well known as the seat of a convict prison, originally built, 1806, for prisoners of war.

Dart'mouth, seaport of Devon, England; 32 m. S. by W. from Exeter; on the estuary of the Dart, near the ocean; has many old houses and an ancient castle. The entrance to the river is defended by a battery. Dartmouth carries on much trade with Newfoundland and with Mediterranean countries. It is the point of departure for mail steamers to S. Africa. Here Richard Lion-heart assembled the crusading fleet, 1190. Dartmouth was incorporated by charter of Edward III, 1342; was taken by Prince Maurice, 1643; and recaptured, 1645–46, by Fairfax.

Dartmouth Col'lege, nonsectarian institution at Hanover, N. H., having its origin in Moore's Charity School for Indian Youth, established at Lebanon, Conn., by Rev. Eleazar Wheelock, 1754; charter for a college to be connected with it, yet a distinct institution, issued 1769; school removed to Hanover, 1770; first class graduated, 1771; the Charity School, under

an independent charter, remained as an academical department till 1849; name of institution changed, 1816, to Dartmouth Univ. by act of legislature, which body assumed control of its affairs; suit against the state by the opposing trustees successful, Daniel Webster being one of the counsel; university organization dissolved and the trustees sustained, the decision vindicating private trusts and securing their inviolability; institutions associated or connected with Dartmouth: New Hampshire Medical College, Chandler Scientific School, Thayer Engineering School, New Hampshire College of Agriculture and the Mechanic Arts, Tuck School of Business and Finance.

Dartmouth College Case, celebrated precedent in American constitutional law. Dartmouth College was founded under a charter granted by George III in 1769. After the Revolution the sovereignty over the territory in which the college was situated passed to the State of New Hampshire. In 1816 the legislature of New Hampshire passed an act changing the name of the institution to "Dartmouth University," enlarging its board of trustees and assuming control of its affairs. The trustees sought in the Supreme Court of New Hampshire to have the act declared unconstitutional, but the court sustained the legislature. Appeal was then taken to the Supreme Court of the U. S., John Marshall being then chief justice. The cause of the college was there argued by Webster and other able counsel, and fully sustained by the court. The university organization was dissolved, and the old college board of trustees sustained, on the ground that, under the clause of the U. S. Constitution which prohibits the states from passing any laws impairing the obligation of contracts, the legislature of New Hampshire had no power to legislate the old college charter out of existence, or to disregard its conditions. Dartmouth, in comparative poverty, was thus instrumental in establishing the sacredness of private trusts.

Daru (dä-rü'), **Pierre Antoine Noël Bruno** (Comte), 1767–1829; French historian; b. Montpellier; accepted the principles of the Revolution, but was imprisoned during the Reign of Terror; lieutenant general of the Army of the Danube abt. 1795; member of the Tribunate, 1802; Councilor of State, 1805; commissioner for the execution of the treaties of Tilsit and Vienna; chief Minister of State, 1811; president French Academy, 1815; member Chamber of Peers, 1819; chief work, "History of Venice," 1819.

D'Arusmont (dä-rüs-mōn'), **Frances,** maiden name, FANNY WRIGHT, 1795–1852; Scottish-American philanthropist and reformer; b. Dundee; came to the U. S., 1818–25; purchased land where Memphis, Tenn., now stands for her famous experiment for the instruction and enlightenment of the colored race; after years of expensive and unsuccessful effort, her people were freed and sent to Haiti; lectured in many parts of the U. S. on social, religious, and political questions; visited France, and, 1838, married M. d'Arusmont; union was unfortunate, and with her daughter she returned to the U. S. D. in Cincinnati.

Dar'win, Charles Robert, 1809–82; English naturalist; b. Shrewsbury; son of Dr. R. W. Darwin and grandson of Dr. Erasmus Darwin; volunteered as naturalist on the *Beagle* exploring expedition around the world, 1831, and contributed to the narrative of the cruise the volume on natural history and geology. Published "The Structure and Distribution of Coral Reefs," 1842; "Geological Observations on Volcanic Islands," 1844; "Geological Observations on S. America," 1846; "The Origin of Species by Means of Natural Selection," 1859, which was soon translated into many languages, and became the subject of more discussion than any volume of the age. Among his later works are "Fertilization of Orchids," 1862; "Variation of Animals and Plants under Domestication," 1868; "The Descent of Man, and Selection in Relation to Sex," 1871; "On the Expression of the Emotions in Men and Animals," 1872; "The Results of Cross and Self-Fertilization in the Vegetable Kingdom," 1876; and "The Formation of Vegetable Mold through the Action of Worms," 1881. His remains were interred in Westminster Abbey. See DARWINISM; EVOLUTION.

Darwin, Sir George Howard, 1845– ; English scientist; son of Charles R. Darwin; studied law, but never practiced; contributed to the "Transactions of the Royal Society" a paper, "On the Influence of Geological Changes on the Earth's Axis of Rotation," 1876; "On the Remote History of the Earth," 1878; since occupied with physical, mathematical, and astronomical study, with investigations on the pressure of loose sands, on changes in level of the earth's surface and minute earthquakes; assisted Sir William Thompson, 1882, in preparation of new edition of Thompson and Tait's "Natural Philosophy"; Plumian Prof. of Astronomy and Experimental Philosophy at Cambridge, 1883.

Dar'winism, term frequently used as synonymous with evolution, but properly more restricted in its meaning. Evolution is the broader term, and implies development by descent wherever it may occur. Darwinism forms one portion or one aspect of organic evolution. Organic evolution teaches that all living forms have descended by variation from a smaller number of more primitive original forms, while Darwinism is an attempt to explain one part of that process. According to Darwin the existence of variation is admitted without much reference to its causes. His great principle is what he has called "natural selection," and what Herbert Spencer aptly termed the "survival of the fittest." In originating new varieties of plants or new breeds of animals the farmer exercises an artificial selection. He takes those individuals which present variations in some desired line, and uses these for reproduction; with the next generation a similar selection is made, and so on until the result is far different from the parent stock. Darwin maintained that a somewhat similar, though not intelligent, selection occurs in nature, those individuals which present

some variation which better fits them to their surroundings being more apt to survive than their less favored relatives. The rate of reproduction of any organism is so rapid that were it not checked it would soon completely fill the earth. There is consequently a struggle for existence, not only between individuals of the same species, but between different species as well, and in this struggle the fittest must, as a rule, survive. Thus nature exercises a selection, and, like the breeder, originates new varieties. The same process carried further produces wider divergences from the parent stock until at last new species and higher groups are differentiated. See EVOLUTION; NEO-LAMARCKIANISM.

Da'sent, Sir George Webbe, 1820–96; English author; b. St. Vincent, W. Indies; called to the bar, 1852; civil service commissioner, 1870; for some years an assistant editor of the London *Times*; became, 1871, editor of *Fraser's Magazine*; translated "The Younger Edda," 1842; published "The Norsemen in Ireland," 1855; "The Story of Burnt Njal," 1861; "Selection of Norse Tales," 1862, etc.; also edited "An Icelandic-English Dictionary," 1874; knighted, 1876.

Dash'kof, Ekaterina Romanovna, 1743–1810; Russian princess; wife of Prince Dashkof and a friend of Empress Catherine II; was one of the chiefs of the conspiracy which dethroned Peter II; soon afterwards lost the favor of Catherine, and passed several years in France, Germany, and Italy; returned home, 1782; appointed president of the Academy of Sciences at St. Petersburg; first president of the Russian Academy, founded 1784; superintended the compilation of a dictionary of the Russian language.

Dasyure (dăs'ĭ-ūr), common name for any member of the genus *Dasyurus* and family *Dasyuridæ*; a group of flesh-eating marsupial mammals. The dasyures are found in Australia, Tasmania, New Guinea, and some of the adjacent islands. Most species are spotted, and have bushy tails. The viverrine dasyure, a typical species, is about 2 ft. in total length, gray or brownish-black above, spotted with white on the head and body; light brown or whitish beneath. It is found in Tasmania and New South Wales. It is destructive to poultry.

Date, fruit of one of the palm trees of SW. Asia and N. Africa. A tall tree, 100 or more ft. in height, with a slender stem, covered with the scars of the fallen leaves, and surmounted by a heavy crown of leaves. The flowers are borne in clusters upon long recurving stalks which arise between the leaves. Each pistillate flower contains three separate pistils, but only one of the three develops, forming a one-seeded, fleshy fruit, the date of commerce. Dates are highly nutritious, containing fifty-eight per cent of sugar, and other digestible substances. They are the chief article of food of the inhabitants of the regions where they abound, and are largely exported to all parts of the civilized world. In its native region the seeds are ground, and used as food for domestic animals. When roasted, the seeds are used as a substitute for coffee. The ripe fruit yields a delicious sirup; from the fermented fruits an alcoholic drink is made; from the sap which exudes upon the removal of the terminal bud "palm wine" is made; the terminal bud is edible; from the fibrous parts of the leaves and stems, ropes, baskets, mats, etc., are made; the spongy substance of the trunk contains a starchy and edible substance; and the trunk is used for building purposes.

Date Line. See CHANGE-OF-DAY LINE.

Da'tis, Persian general sent by Darius to invade Greece; commanded the army in conjunction with Artaphernes; defeated at Marathon by Miltiades, and later put to death by the Spartans.

Datu'ra, genus of herbs of the family *Solanaceæ*; natives chiefly of warm climates in both hemispheres. *D. stramonium* (thorn apple, Jamestown or "Jimson" weed of the U. S., where it is naturalized) furnishes the drug stramonium. Many species are cultivated in greenhouses for the beauty of their flowers. They all possess narcotic properties similar to those of belladonna.

Daubenton (dō-băn-tōn'), **Louis Jean Marie,** 1716–1800; French naturalist; b. Montbar; studied medicine in Paris, and began, 1742, to collaborate with Buffon on his natural history; 1745, curator and demonstrator of the cabinet of natural history in Paris, of which he had charge for nearly fifty years; Prof. of Natural History in the College of France, 1778; contributed many scientific articles to the first "Encyclopédie," edited by Diderot, and introduced the merino sheep into France.

Daubeny (dōb'nĭ), **Charles Giles Bridle,** 1795–1867; English naturalist; b. Stratton; for many years Prof. of Chemistry, Botany, and Rural Economy in the Univ. of Oxford; visited the U. S., 1837; chief works, a "Description of Active and Extinct Volcanoes, with Remarks on their Origin," 1826; "Sketch of the Geology of North America," and "Lectures on Agriculture," 1841.

D'Aubigné (dō-bēn-yā'), **Jean Henri Merle,** 1794–1872; Swiss historian; b. near Geneva; son of Louis Merle; pastor of the French Protestant Church in Hamburg, 1818; court preacher in Brussels, 1823; Prof. of Church History in the Theological Seminary of the Evangelical Church at Geneva, 1831; principal work, "History of the Reformation in the Sixteenth Century," 1835; 1863, began to publish a "History of the Reformation in Europe in the Time of Calvin"; also published "The Protector, or the Republic of England in the Time of Cromwell," 1848. He is much praised for the vivacity of his style, and the orthodoxy of his opinions, but not for exactness, or weight, as an authority.

Daubigny (dō-bēn-yē'), **Charles François,** 1817–78; French landscape painter; b. Paris; one of the greatest masters of his century;

works include "On the River Oise,". "The Vintage," "The Lake of Gylieu," "The Harvest."

Daudet (dō-dā'), **Alphonse,** 1840–97; French author; b. Nîmes; settled in Paris, 1857; one of the leaders of the naturalistic school; works include poems; the dramas, "La Dernière Idole," "Lise Tavernier"; the stories, "Lettres de mon Moulin," and "Tartarin de Tarascon"; the novels, "Jack," "Le Nabab," "Les Rois en Exil," "Fromont Jeune et Risler Aîné," "Nouma Roumestan," "L'Evangeliste," "Sapho," "Tartarin sur les Alps," "L'Immortel," "Port Tarascon," "La Belle Nivernaise," "Contes du Lundi."

Daudet, Louis Marie Ernest, 1837– ; French novelist and historian; brother of Alphonse Daudet; b. Nîmes; resided in Paris after 1857; historical works include "Cardinal Consalvi," "France and the Bonapartes," "History of the Restoration"; novels, "Henrietta," "Madame Robernier," "The Carmelite," "The Venus of Gordes."

Daugh'ters of the Amer'ican Revolu'tion, patriotic society organized 1890; composed of women over eighteen years of age descended from ancestors who rendered material aid to the cause of independence as soldiers, sailors, or civil officers in the service of the colonies or states.

Daughters of the Confed'eracy, Unit'ed, patriotic society organized in Nashville, Tenn., 1894; composed of widows, wives, mothers, sisters, and lineal descendants of military, naval, and civil officers of the Confederate states.

Daughters of the King, organization of women confined to the Protestant Episcopal Church; founded in New York, 1885, to promote "spread of Christ's kingdom among women and strengthen parish life."

Daughters of the Revolu'tion, Gen'eral Society of, patriotic organization founded in New York, 1891; composed of women lineally descended from an ancestor who actually assisted in establishing American independence by service rendered during the War of the Revolution.

D'Aumale'. See AUMALE.

Daun (down), **Leopold Joseph Maria** (Graf von), 1705–66; Austrian general; b. Vienna; served with distinction against the Turks; fought in the war of the Austrian succession; field marshal, 1754; commander in chief of the imperial army in the Seven Years' War; June 18, 1757, defeated Frederick the Great at Kolin; October 14, 1758, gained a victory over Frederick at Hochkirchen; in 1759, at Maxen, forced Gen. Fink and his whole army to surrender; August 15, 1760, was defeated at Liegnitz, and November 3, 1761, at Torgau.

Daunou (dō-nō'), **Pierre Claude François,** 1761–1840; French statesman; b. Boulogne-sur-Mer; was elected, 1793, to the National Convention, in which he acted with moderation, opposing the execution of Louis XVI and the proscription of the Girondists; the first president of the Council of Five Hundred, and member of the committee which formed the constitution of the year VIII (1800); Prof. of History in the College of France, 1819.

Dauphin (dō-făn'), title of the eldest son and heir apparent to the King of France; originally the title of the sovereign lords of the province of Dauphiné; 1349, Humbert, lord of Vienne, dying without issue, bequeathed his possessions to Charles of Valois, on condition that the heir apparent to the throne of France should bear the title of *Dauphin de Viennois*; title abolished, 1830, the last dauphin being the Duke of Angoulême.

Dauphiné (dō-fē-nā'), former province of France; now comprised in the departments of Drôme, Hautes-Alpes, and Isère; was added to the Roman Empire, and formed a part successively of the Burgundian kingdom, Carlovingian, and German empires; chief towns were Grenoble, Vienne, Gap, and Valence. Before the end of the twelfth century it was divided into small principalities, of which the Dauphins of Viennois became the most powerful, and extended their authority at the expense of their neighbors. In 1349 it was ceded to the crown of France, and was governed by the king's son as a separate province till 1457, when it was incorporated with the kingdom.

Dauw. See ZEBRA.

Dav'enant, Sir William, 1605–68; English dramatist; b. Oxford; began to write at an early age; succeeded Ben Jonson as poet laureate, 1637; manager of Drury Lane Theater, 1639; joined the king's side in the civil war, and served with distinction throughout the struggle. Taking command of a colonizing expedition to Virginia, he was captured and thrown into prison, where he devoted himself to the composition of his epic, "Gondibert," the best known of his works. After the Restoration his prosperity returned, and he enjoyed the favor of the court until his death. His entertainments are considered by some to be the beginning of the representation of operas in England.

Dav'enport, capital of Scott Co., Iowa; on the Mississippi at the foot of the Upper Rapids; 330 m. above St. Louis; occupies the base and higher parts of a bluff which rises gradually and extends along the river 3 m.; iron railway and carriage bridge across the Mississippi, built by the U. S. Govt. and the Chicago, Rock Island & Pacific Railroad Company at a cost of $1,200,000, connects Davenport with Rock Island, and with the city of Rock Island, on the Illinois shore; a second railway bridge was completed, 1899. The city contains an Academy of Natural Sciences, which possesses a scientific library and a very fine collection of relics of the ancient mound builders of the Mississippi valley; Masonic Temple, St. Ambrose College, St. Katharine's Hall, College of the Immaculate Conception, Mercy and St. Luke's hospitals, Iowa Orphans' Home, Soldiers' Orphans' Home, U. S. Govt. building, and Carnegie Library; and is the see city of the Protestant Episcopal Church in Iowa and of the Davenport diocese of the Roman Cath-

olic Church. The flour and grain business is important, and lumber, agricultural machinery, farming tools, woolen goods, glucose, macaroni, vermicelli, barrels, furniture, cordage, vinegar, paints, watches, canned goods, clothing, pottery, carriages, steam engines and machinery, cigars, etc., are among the products. Pop. (1906) 40,706.

Dav'enport, Fanny Lily Gipsy, 1850–98; American actress; b. London, England; daughter of Edward L. Davenport, the actor; made her first appearance at the Howard Athenæum in Boston as the child in "Metamora"; appeared in New York as the *King of Spain* in "Faint Heart Never Won Fair Lady," 1862; played under the management of Augustin Daly at the Fifth Avenue Theater, New York, 1869; personated a large number of different characters among them *Mabel Renfrew* in "Pique," which ran for 250 nights; made many starring tours throughout the U. S., and achieved success as *Cleopatra* in Sardou's play of that name.

Davenport, John, 1597–1670; Puritan colonist; b. Coventry, England; entered the Anglican priesthood; his puritanical principles and practice obliged him to leave the Established Church, and, 1633, he removed to Holland, returning, 1635, to England, where he aided in obtaining the patent of the Massachusetts colony; 1637, went to Boston, and, 1638, became a founder of the New Haven colony; 1639, became one of the "seven pillars," as the governing body of the settlement was called, and, 1660, sheltered Goffe and Whalley, the regicides.

Da'vid, abt. 1085–1015 B.C.; one of the most remarkable characters in history; son of Jesse; b. Bethlehem, Judea. In youth was a shepherd; acquired great skill as a musician; received into the household of Saul, King of Israel, who was troubled with an "evil spirit." David, by playing on the harp, soothed and "refreshed" Saul, and "the evil spirit departed from him." Not long afterwards, David slew in single combat a Philistine giant, Goliath, and, as a reward for later exploits, received Michal, Saul's daughter, in marriage. Saul was offended by the praises which David received, and made repeated attempts on his life, so that he had to fly for safety to Achish, King of Gath.

When David was thirty years old Saul was slain in a battle with the Philistines, and David was made king of the tribe of Judah, reigning at Hebron for seven and one half years, while Ishbosheth, Saul's son, was in power on the E. side of the Jordan, and for two years was obeyed by all the tribes except Judah. After the murder of Ishbosheth, David became king of the whole nation. He was victorious in all his wars, and under his sway Israel acquired great prosperity and power. One of his sorest trials was the rebellion and death of his favorite son, Absalom. Solomon, his son, succeeded to the throne. As a writer of religious poetry, and especially of that kind which comes home to the feelings of all sorely tried hearts, David has no equal among the poets of the human race. He wrote 80 of the 150 psalms in the Psalter.

David, name of two kings of Scotland. DAVID I, 1084–1153; was the sixth son of Malcolm III; married, 1110, Maud, a great-niece of William the Conqueror; succeeded his brother, Alexander I, 1124, and swore to maintain the right of his niece Matilda to the throne of England in case her father, Henry I, left no male issue. Henry died, 1135, and David waged war against Stephen, who disputed her claim to the throne. David invaded England, and was defeated at the "Battle of the Standard" near Northallerton, 1138. He promoted manufactures, education, and civilization, and his efforts brought the Celtic and Anglo-Saxon elements of the kingdom into more harmonious relations. Though never formally canonized he has often received the title of saint. He left the throne to his grandson, Malcolm IV. DAVID II, or DAVID BRUCE, 1323–71; was a son of Robert Bruce, whom he succeeded, 1329. His kingdom was invaded, 1332, by Edward Baliol, who defeated the army of David at Dupplin Moor, and, 1333, the Scotch were again routed at Halidon Hill. The king was expelled, and retired to France, but his subjects continued to fight for him, and he recovered the throne, 1342. Having invaded England, 1346, he was defeated at Neville's Cross, captured, and detained until 1357. From that time till his death his base subservience to the English throne placed his kingdom in a condition of dependence.

David (dă-vēd'), **Félicien César,** 1810–76; French composer; b. Cadenet, Vaucluse; wrote a number of operas, symphonies, etc., but his fame rests chiefly on the symphonic ode entitled "The Desert," for orchestra and male voices.

David, Jacques Louis, 1748–1825; French historical painter; b. Paris; the head of the French school during the First Empire. A portrait of Madame Récamier, in the Louvre, is one of his best works in the line of classicism. Several of his most important compositions are in the Versailles Museum.

David, Pierre Jean (best known as DAVID D'ANGERS), 1789–1856; French sculptor; b. Angers; soon after the revolution of 1830 was employed by the government to fill the pediment of the Pantheon with sculptures. Among his works are the statue of the young drummer boy, Barra; busts of Washington, Lafayette, Arago, Goethe, and Lamartine, and statues of Cuvier, Racine, and Jefferson.

Da'vid, Saint, patron saint of Wales. The dates of his birth and death are unknown, though his life can be located in the sixth century; founded a monastery in the vale of Rhos; became a very famous theologian; and ultimately founded a see at Menevia; was canonized by Pope Calixtus I in the twelfth century. March 1st is celebrated as his festival.

Davies (dā'vēz), **Sir John,** 1570–1626; English poet; b. Wiltshire; appointed Solicitor General of Ireland, 1603; published, 1612, "A Discourse of the True Reasons why Ireland

Has Never Been Entirely Subdued"; 1620, elected to Parliament; chief poem, entitled "Nosce Teipsum," 1599, is a good type of the intellectual or metaphysical style of poetry, and from its clear and condensed expression of abstract thought has been likened to Pope's "Essay on Man"; became Lord Chief Justice, 1626.

Davies, Sir Louis Henry, 1845– ; Canadian jurist; b. Charlottetown, P. E. I.; admitted to the bar, 1866; was successively Solicitor General, Premier, and Attorney-General of Prince Edward Island; entered the Dominion Parliament, 1882; one of the British counsel before the International Fishery Arbitration at Halifax, 1877; joint delegate with Sir Wilfrid Laurier to Washington on Bering Sea seal question, 1897; member Joint High Commission for settlement of all questions between Canada and the U. S., 1898; Canadian Minister of Marine and Fisheries, 1896–1901; afterwards a judge of the Supreme Court of Appeals.

Da'vis, David, 1815–86; American jurist; b. Cecil Co., Md.; settled in Bloomington, Ill., 1836; judge of the Eighth Judicial Circuit of Illinois, 1848, 1855, 1861; appointed by Pres. Lincoln an Associate Justice of the U. S. Supreme Court, 1862; resigned, 1877; U. S. Senator, 1877–83; president *pro tem.* of Senate, 1881–83.

Davis, Jefferson, 1808–89; American statesman; b. Christian Co., Ky.; graduated at West Point, 1828; served in the army, 1828–35; resigned and became a cotton planter in Mississippi; Democratic member of Congress, 1845–46; served with distinction in the Mexican War in command of a regiment of Mississippi volunteers; U. S. Senator, 1847–51; Secretary of War, 1853–57; U. S. Senator, 1857–61, resigning January 21st; inaugurated Provisional President of the Confederate states, February 18, 1861, and President, February 22, 1862; left Richmond, April 2, 1865, the day before its occupation by the Federal forces; was captured near Irwinsville, Ga., May 10th; imprisoned in Fortress Monroe, Va., 1865–67; amnestied, December, 1868; president of a life-insurance company at Memphis, Tenn.; after 1879 resided at Beauvoir, Miss.; died New Orleans; remains were reinterred at Richmond, Va., 1893; published "Rise and Fall of the Confederate Government," 1881.

Davis, John, abt. 1550–1605; English navigator; b. Sandridge; made three voyages to find the NW. passage to the E. Indies; on the first discovered the strait bearing his name, 1585; on the third, 1587, reached the strait afterwards explored by Hudson; died at sea; wrote "The World's Hydrographical Description."

Davis, Varina Anne Jefferson, 1864–98; called THE DAUGHTER OF THE CONFEDERACY; b. Richmond, Va.; daughter of Jefferson Davis; author of "The Veiled Doctor," a novel, and of essays and tales.

Davitt (dă'vĭt), Michael, 1846–1906; Irish political leader; b. Straide, Mayo; son of a poor peasant; worked in a cotton factory in Manchester, England, then in a printing office; indicted for treason, 1870, and sentenced to fifteen years' penal servitude; released on ticket of leave, 1877; started the land agitation in his native county, 1879; with Parnell and others founded the Land League, and became superintendent; arrested, 1881, on account of the state persecution of the executive of the Land League; served two other terms of imprisonment; was elected to Parliament from County Meath, 1882, but disqualified because his prison sentence had not expired; re-elected, 1892, but unseated by petition; represented County Cork, 1892–93, and Kerry and Mayo, 1895–99; published "Leaves from a Prison Diary," "Life and Progress in Australia," "The Boer Fight for Freedom," etc.

Da'vors, Jo, author of a work, now rare and valuable, called "The Secrets of Angling," published 1613; it is quoted by Walton. The writer's name is doubtless a fictitious one; the authorship has been ascribed to John Donne, John Davisson, John Davies, and other writers of that day.

Davout (dă-vō'), or Davoust', Louis Nicolas, Duke of Auerstadt and Prince of Eckmühl, 1770–1823; French marshal; b. near Noyers; entered the army in early youth; went with Bonaparte to Egypt, 1798; general of division, 1800; commanded the cavalry of the Army of Italy; received a marshal's baton, 1804; led the right wing at Austerlitz, 1805; defeated the Prussians at Auerstadt, October 14, 1806; created Prince of Eckmühl, 1809; took part in the Russian campaign of 1812; later was Governor of the Hanse towns, and defended Hamburg for several months against the allies; during the Hundred Days (1815) was Napoleon's Minister of War; commander in chief of the French armies, 1815, after the battle of Waterloo, and was made a peer of France, 1819.

Da'vy, Sir Humphry, 1778–1829; English chemist; b. Penzance; son of a wood carver; apprenticed, 1795, to an apothecary; Assistant in a Pneumatic Institution in Bristol, 1798; made his first contribution to science, 1799; "Essays on Heat and Light, with a New Theory of Respiration"; in 1800 published "Researches, Chemical and Physical," which made known his discovery of the peculiar properties of nitrous oxide gas; lectured before the Royal Institution, London, 1801; professor, 1802; in 1807 announced his great achievement, the decomposition by galvanism of the alkalies; invented a safety lamp, 1815–17; knighted, 1812; made a baronet, 1818; President of the Royal Society, 1820–27; works include "Elements of Chemical Philosophy," "Elements of Agricultural Chemistry"; papers concerning "Fire Damp," etc.; and accounts of his researches relating to "Oxymuriatic Acid and Fluoric Compounds."

Davy Jones' Locker, mariners' term for the sea as a grave of sailors; "Davy Jones" being Satan, the fiend of the sea.

Daw. See JACKDAW.

Dawes, Henry Laurens, 1816–1903; American statesman; b. Cummington, Mass.; engaged in journalism, and then practiced law at N. Adams; removed to Pittsfield; in State Legislature, 1848–50; then entered State Senate; Attorney for the W. District of Massachusetts until 1857; member of Congress, 1857–75; Republican U. S. Senator, 1875–93; after 1893 Chairman of the Commission to the Five Civilized Tribes of Indian Territory; created the entire system of Indian education.

Daw'son, George Mercer, 1849–1901; Canadian geologist, geographer, and ethnographer; b. Pictou, Nova Scotia; son of Sir J. W. Dawson; naturalist to H. M. N. American Boundary Commission, 1873–75; member of the Geological Survey of Canada, 1875, and afterwards director; Bering Sea Commissioner on the part of Great Britain, 1891–92.

Dawson, Sir John William, 1820–99; Canadian geologist; b. Pictou, Nova Scotia; made a special study of the geology and mineralogy of Nova Scotia and New Brunswick; was Superintendent of Education in Nova Scotia, 1850–53; in 1885 became Principal of McGill College, Montreal, and Prof. of Natural History; subsequently was made Vice Chancellor; established McGill Normal School, 1857, becoming its principal, and a school of civil engineering, 1858; in 1882 was elected President of the American Association for the Advancement of Science and of the Royal Society of Canada; in 1886 President of the British Association; in 1885 was knighted. The most important of his geological discoveries, that of the *Eozoön canadense* of the Laurentian rocks, believed to be the lowest form of animal life, was made in 1864, and is recorded in "Devonian and Carboniferous Flora of E. N. America." He was an opponent of the Darwinian theory of evolution. His publications include "Arcadian Geology," "Archaia, or Studies of the Cosmogony and Natural History of the Hebrew Scriptures," "Science and the Bible," "The Geological History of Plants," "Modern Ideas of Evolution," "The Ice Age in Canada."

Dawson or **Dawson Cit'y,** town and port of Yukon Territory, Canada; on the Upper Yukon River, 1,300 m. from its mouth; in the Klondike mining region; founded, 1896, immediately after the discovery of gold on Bonanza Creek; distributing point for the mining camps in the Klondike region; contains hotels, banks, hospitals, theaters, warehouses, and newspapers; in the surrounding country wheat, barley, and oats are grown; temperature of three coldest months – 24° F. Pop. 11,000.

Day, or **Daye, Stephen,** abt. 1610–68; American colonial printer; b. London; employed by Rev. Joseph Glover to accompany him to America, 1638, to operate a printing press which he was going to set up in Massachusetts. Mr. Glover died on the voyage and the press was placed in the house of Rev. Henry Dunster, first president of Harvard College. The first book printed in the colonies was issued from it, 1640, entitled "The Whole Booke of Psalmes, faithfully translated into English metre."

Day, period of the earth's rotation on its axis. The distance of the first fixed stars is so great that their apparent positions are not affected by the motion of the earth in its orbit; hence the time between the successive passages of a fixed star or any other equally fixed point of the heavens over a meridian is uniform; that time is called a sidereal day. In common life the day is the interval between two successive returns of the sun to the meridian; this period is called the solar day. It varies from several causes, its average length being about four minutes greater than that of the sidereal day. The principal causes of variation are the motion of the earth in its orbit and its varying distance from the sun. The sidereal day is 23 h. 56 m. 4.09 s. of mean solar time. Astronomers begin the day at noon, and count the hours from 1 to 24. In England, since January 1, 1885, the day of 24 hours begins at midnight at Greenwich Observatory. For all peoples, nations, and languages, using maps with longitude E. and W. from Greenwich, each day begins at the meridian of 180°, slightly E. of New Zealand in the S., and intersecting E. Siberia in the N., and so the last day of the nineteenth century and the first day of the twentieth century were on the earth together; the latter following the former from 180°, westerly to Greenwich, and on again to 180°, where it gave place to January 2d. In most countries the civil day begins at midnight, and the hours are counted from 1 to 12 at noon, and thence from 1 to 12 at midnight.

Day Lil'y, perennial lilylike plant of the genus *Hemerocallis.* Day lilies have fleshy fibrous roots and long leaves with a ridge on the back and two ranked at the base of the stalks which arise from the ground, and which have at the top several large yellow flowers. The flowers collapse and decay after expanding for a single day. Several varieties are cultivated in gardens.

Days'man, archaic or obsolete term for mediator, arbiter, or umpire found in English literature from the fifteenth century onward, and said to be dialectical still in the N. of England.

Day'ton, capital Montgomery Co., Ohio; on the Great Miami, at the mouth of Mad River; 60 m. NE. of Cincinnati. The Miami Canal passes through, connecting the Ohio with Lake Erie. Public buildings and institutions include the S. Lunatic Asylum of Ohio, Central National Soldiers' Home, the County Orphan Asylum, a public library, St. Mary's Catholic Institute for Boys, and the Academy of Notre Dame. There are manufactures of railway cars, agricultural implements, castings, stoves, cash registers, carriages and wagons, glucose, paper, cotton and woolen goods, liquors, etc., and quarrying of limestone. Pop. (1906) 100,799.

Dea'con, inferior officer of the Christian Church. In the Latin, Greek, and Anglican

churches, deacons are clergymen ranking next below priests; in most Protestant bodies they are laymen, assistants of the minister, to whom is usually committed the care of the poor and of the temporalities of the church.

Dea'coness, female officer of the early Church. The apostolic origin of the institution of deaconesses is derived from Rom. xvi, 1. Their chief duties were to preside over that part of the church set apart for women, to instruct the female catechumens, to care for the sick and poor of their own sex, and to be present at all conversations held by the clergy with women. The order became extinct in the Latin Church before the tenth century, and in the Greek during the twelfth. Its place is taken in the former by the various sisterhoods. In recent times the title has been revived in Protestant churches, for the communities of women devoted to charitable duties.

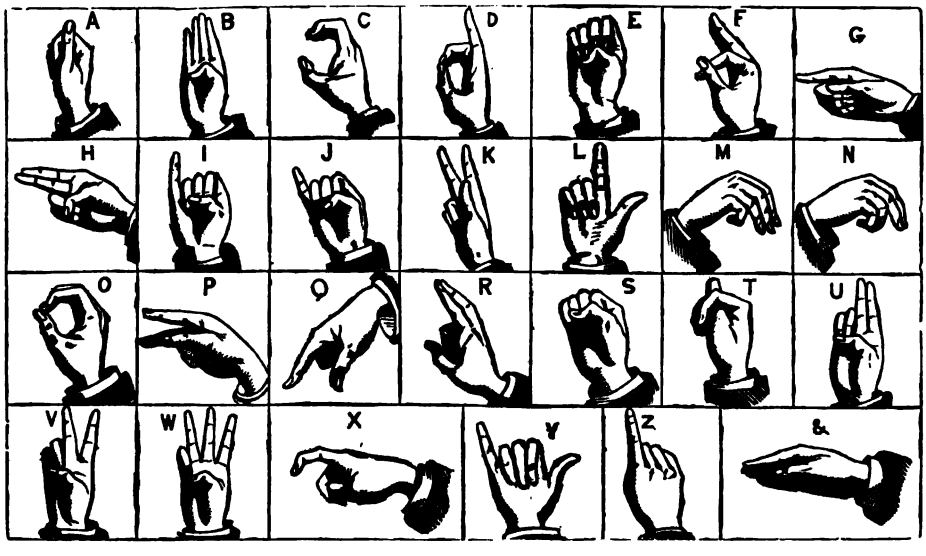
Dead, Book of the. See RITUAL OF THE DEAD.

Dead-let'ter Of'fice, a division of a post office to which all mail matter undelivered at the end of a specified time, or of such a nature that it cannot be transmitted, is sent for disposition. Letters addressed to persons "not found," and packages containing articles of a perishable or injurious character, constitute a large proportion of the matter dealt with. The articles found in the packages are sold at public auction.

Dead'ly Night'shade. See BELLADONNA.

Dead Reck'oning, in navigation, the calculation of a ship's place at sea without taking observation of the heavenly bodies; is derived from the distance which the ship has run and from the courses steered after departure from a place whose latitude and longitude are known. The distance is obtained from the rate of sailing as shown by the log and the time elapsed, and the direction of the course is obtained from the compass. The data are liable to errors and uncertainties, in consequence of currents, changes in the course and intensity of the winds, fluctuations in the declination of the compass, and other causes of disturbance.

Dead Sea, or Sea of Sod'om, called in Scripture the SALT SEA, SEA OF THE PLAIN, or EAST SEA; celebrated lake in S. Palestine; N. end 20 m. E. of Jerusalem; length, 40 m.; breadth from 5 to 9¾ m.; greatest depth, found in the N. portion, 1,308 ft.; depression below the Mediterranean, 1,316.7 ft. It is fed by the Jordan and other streams, but has no apparent outlet, and the surplus water is carried off by evaporation. It is inclosed by cliffs of limestone. The shores present a scene of desolation and solitude, encompassed with deserts and dreary salt hills. On the S. shore is a remarkable mass of rock salt called Usdum (Sodom), which by some has been supposed to indicate the site of the ancient city of Sodom. The water has high specific gravity, ranging between one eighth and one fourth heavier than pure water, and intense saltness (containing about twenty-five per cent by weight of salts), about seven times as much as sea water. The saline matter consists of salts of magnesium and sodium.



SINGLE-HAND ALPHABET.

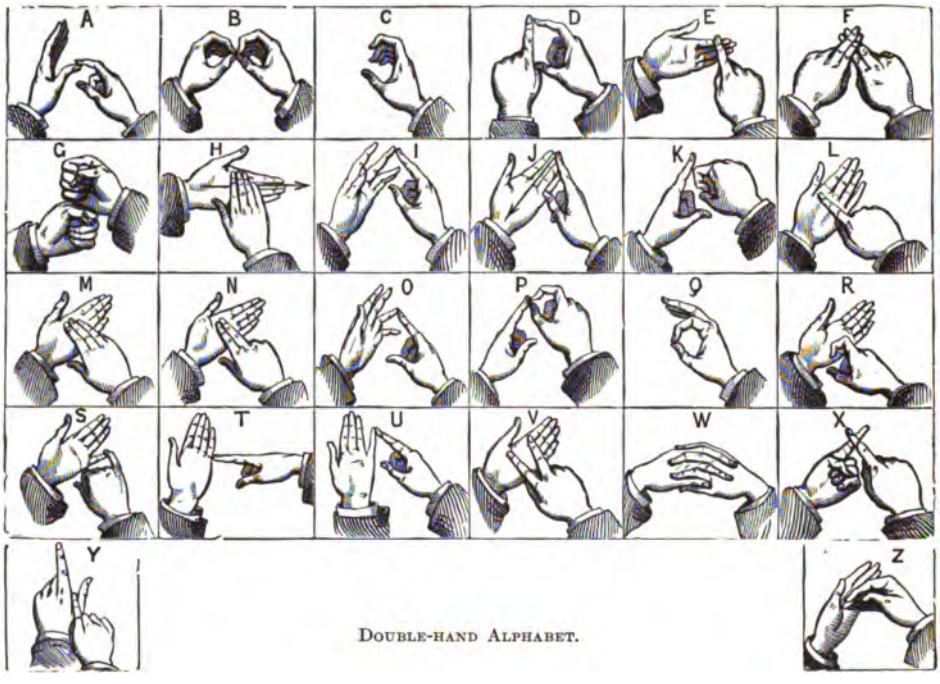
Deaf-mutes, persons who are both deaf and dumb. Those born deaf are dumb, because no child can learn to speak without the guidance of the sense of hearing, which enables one to imitate sounds. The same is true of those made deaf by disease or accident in early infancy. After learning to speak, the occurrence of deafness does not greatly impair the speech, although persons becoming deaf during childhood sometimes retain throughout life the childish tone which they have learned. Congenital deafness is believed to be caused by

imperfection of development under influences which lower the grade of nutrition in the embryo during gestation, or which affect, through one or both of the parents, the immediate result of conception. Among these influences the most marked appear to be intemperance, marriages between those nearly related, syphilis, and scrofula.

The earliest account of a deaf-mute being taught to speak is ascribed to Bede, abt. 700 A.D. Rodolph Agricola, of Groningen, who died 1485, first mentioned an instructed deaf-mute. Ponce de Leon, a Spanish monk, who died, 1584, and Pasch, a clergyman of Brandenburg, were the first teachers of whom we have any account. Juan Pablo Bonet published at Madrid the earliest known treatise on deaf-mute instruction. In the latter part of the seventeenth century Dr. John Wallis, of Oxford, and John Conrad Amman, of Holland, published treatises on this art. In England the first manual alphabet was published by George Dalgarno, a Scotchman. The first school for deaf-mutes in Great Britain was established in Edinburgh, 1760, by Thomas Braidwood. The first public establishment in the world for the instruction of deaf-mutes was founded at Leipsic, 1778, by the Elector of Saxony, under the directorship of Samuel Heinecke.

The credit of systematizing the instruction of the deaf and dumb in France is ascribed to the Abbé Charles Michel de l'Épée, of Paris, but greater success was in some individual cases attained by a Spaniard, Jacob Rodriguez Pereira, whose school was conducted at Bordeaux. These men undoubtedly both contributed to the work; as did also Sicard, the successor of the Abbé de l'Epée, and Itard. In the U. S. the system matured by the experience of the French was brought over, 1816, by Dr. Thomas H. Gallaudet, with the personal aid of Laurent Clerc, an educated deaf-mute. The most remarkable instances on record of deaf-mute education are those of Laura Bridgman and Helen Keller, both Americans.

The two principal modes of conveying instruction to the deaf and dumb are by the manual sign language, and by the pupils watching the lips of the teacher during articulation. The sign language is much the most easily and rapidly acquired, and is more generally employed. The method of teaching by articulation, the pupil learning to recognize words (and, in time, to utter them) by closely watching the motions of the lips and tongue in speech, is not favored by all experienced instructors. The argument urged against it is that the great length of time required for its acquisition can be better employed in obtaining knowledge according to the sign method. A new method of teaching articulation, the method of visible speech, so called, was invented in 1848 by Prof. Alexander Melville Bell. It consists of a species of phonetic writing, based not on sounds, but on the action of the vocal organs in producing them. The characters of this universal alphabet, as matured in 1864, reveal to the eye the position of those organs in the formation of any sound which the human mouth can utter. In 1872 it was introduced by Alexander Graham Bell, son of the inventor, into the Clarke Institution at Northampton, Mass., where it superseded the old method of imitation, and is the only method of teaching articulation used.



DOUBLE-HAND ALPHABET.

Deaf'ness, loss or imperfection of hearing; may be congenital or acquired, permanent or temporary, complete or incomplete. It may be (1) "nervous"—that is, caused by organic or functional disease of the auditory nerve or of the brain itself. Deafness of this kind is sometimes curable, but frequently it is permanent. It may be (2) the result of local disease or accident. Disease of the structures of the ear frequently follows scarlet fever, and is often of a scrofulous character. When such disease leads to organic changes, even if they be slight, permanent, and perhaps complete, deafness may result. (3) Cerumen (ear wax) may fill the passage of the ear. In such cases oil should be dropped into the ear, and a gentle flow of warm water from a syringe will remove the obstruction. (4) When the *membrana tympani* (ear drum) is accidentally perforated, an artificial eardrum may be fitted. (5) the Eustachian tube may be the seat of inflammation, and require surgical treatment. Counterirritation behind the ears, the use of general tonics, etc., may be beneficial; and this is more especially true of the deafness of aged people. The growth of minute fungi (*Aspergillus,* etc.) in the ear has been reported to be a common cause of disease of that part. The opening and the drum are sometimes covered with the growth, in the form of white or yellow mold. Ringing in the ears, inflammation, and the accumulation of wax are attendant symptoms, and the treatment consists in the application of a solution of carbolic acid, 5 grains to the ounce of water. Hearing may be impaired by long-continued taking of quinine. Inability to hear high shrill notes, like the sound of the grasshopper, may occur in old age, while the lower tones are still perceived. See DEAF-MUTES; EAR.

Deák (dā'ăk), **Ferencz,** 1803–76; Hungarian statesman; b. Kehida; practiced law in his youth; elected to the National Diet, 1832; leader of the Liberal Party; Minister of Justice, 1848, and projected important reforms in that department; on the defeat of the Hungarian patriots in battle, 1849, he quitted public life. Reëlected to the Diet, 1861, he became the leader of the Moderate Party. He is regarded as the master spirit of the movement by which the constitutional autonomy of Hungary was restored, 1867, and large concessions to civil and religious liberty extorted from the emperor. From that time he remained the recognized leader of the Liberal Party, commonly called after him, the "Deák-ist."

Deal, maritime town of Kent, England; on an open beach of the North Sea, near the S. extremity of the Downs; 8 m. NNE. of Dover; has been one of the Cinque Ports since the early part of the thirteenth century; principal activity is boat buildings and trade in provisions and naval stores. Julius Cæsar landed near Deal, 55 B.C. Pop. (1901) 10,581.

Deal, a commercial name for boards exceeding 6 ft. in length and 7 in. wide. When 7 in. or less wide they are called battens. Deals are generally 3 in. in thickness and 9 in. in width; when thinner they are called planks, but thin boards are often called deals. The word deal is commonly used in Great Britain and rarely in the U. S.

Dean, ecclesiastical title applied to officers of several different kinds. In some of the Anglican churches deans are dignitaries next in rank to the bishops. They preside over the chapters of canons and prebendaries, and in the old dioceses nominally elect the bishops.

Deans of college faculties were originally the presiding officers; now the faculty is generally presided over by the head of the university, the functions of the dean consisting in executive routine and enforcement of rules.

Deane, Silas, 1737–89; American diplomatist; b. Groton, Conn.; graduated at Yale, 1758; admitted to the bar, 1761. He was a delegate from Connecticut to the Continental Congress, 1774–76. In 1776 he went to Paris as a secret political and financial agent; and in 1778 as commissioner with Franklin and Arthur Lee; signed the treaty of amity and commerce between France and the U. S.; secured substantial aid from France, but the extravagant arrangements he made to obtain the services of Lafayette, De Kalb, and others were afterwards the bases of charges brought against him by Congress. He was recalled to the U. S., 1778, had trouble as to the settlement of his accounts, due to irregularity and not misapplication; returned to France for papers to enable him to make a full statement. But the publication of certain of his private dispatches had embittered the French Govt. against him, and he passed over to England, where he died in poverty, feeling that he had been unjustly dealt with. In 1842 Congress vindicated his memory by a payment to his heirs of about $37,000.

Dear'born, Henry, 1751–1829; American army officer; b. Northampton, N. H.; served as captain at the battle of Bunker Hill, 1775, and as major in the campaign against Burgoyne, 1777; fought with distinction at Monmouth, 1778; member of Congress from Massachusetts, 1793–97; Secretary of War, 1801–9; promoted to major general, he captured York (now Toronto), Canada, April 27, 1813; U. S. minister to Portugal, 1822–24. Fort Dearborn, the site of Chicago, was named after him.

Death, cessation of vital functions in animals and plants. Local or partial death of an animal is called mortification, gangrene, or sphacelus; if in a bone it is necrosis. Molecular death of animal tissue is called ulceration, except in bony tissues, when it has the name of caries. Systemic death is either (1) by syncope or fainting, when the heart's action fails; (2) by asphyxia, when suffocation occurs or the lungs cease to act; (3) by coma, when death begins at the brain; or (4) by changes in the blood, as some forms of death by poisons received from without or developed in the body in disease. It is asserted by many careful observers that death is usually painless, and that the apparent agony or struggle so often observed is automatic. Many "signs" of death

are used to prevent the very improbable event of premature burial. Among them are the testing for breathing by a feather or mirror, or the absence of heart beats or sounds, the staring eyes, etc.

Death, Broth'ers of, monks of the order of St. Paul the Hermit, suppressed by Pope Urban VIII abt. 1630. They carried a skull, to remind them continually of death.

Death's-head Moth. See ACHERONTIA.

Death Val'ley (so called because a party of emigrants perished there from thirst and starvation, 1849), narrow valley of California, 130 m. long, trending nearly NW. and SE., and walled by the Panamint and Funeral Mountains; lies between 300 and 400 ft. below sea level; is the hottest and driest place in the U. S.

Death'watch, a small beetle inhabiting human dwellings, and producing a sound like the ticking of a watch. This sound being more readily heard in the stillness attending sickness, it has given rise to the superstitious belief that it prognosticates death; hence the name "deathwatch." The noise is produced



DEATH-WATCH.

by the insect beating its head against the wood in which it is concealed. It is supposed to be the call of the male to its mate. The common deathwatch (*Anobium notatum*) is a species of borer. It is about a quarter of an inch in length, and of a dusky brown color. A number of species are found both in Europe and the U. S. The *Atropos pulsatorius*, a very different insect, is called in England by the same popular name, and for the same reason.

Deb'orah, Hebrew prophetess and judge; wife of Lapidoth; gained celebrity by her successful efforts to liberate the Israelites from Jabin, King of Canaan (Judg. iv); supposed to have composed the spirited pæan in the fifth chapter of Judges, describing in vivid colors the battle by the Kizhon, where Jabin's army was destroyed.

Debt, in law, a sum of money due which is certain in amount or capable of being reduced to certainty. Such an indebtedness may arise as the result of a judgment of a court of justice, or on a sealed instrument (specialty), or on an unsealed instrument, or on a mere oral contract. Debts are thus distinguished into such as are of record, or of special contract or simple contract. They may arise either on an express or implied promise. Debts may be collected by an action of debt, or in some instances by an action of covenant. The last action is resorted to when the duty to pay is derived from a contract under seal. The form of action called *indebitatus assumpsit* (being indebted, he promised) may also be used where the indebtedness is incurred by reason of a simple contract. The time within which the action must be brought, under a statute of limitations, varies in the different states.

Debt, Pub'lic, that owed by national, state, county, and municipal governments, and minor civil authorities. A summary of such debts in the U. S. in 1902 shows: National Government, $925,011,637; states and territories, $234,908,873; counties, $196,564,619; cities, townships, villages, and minor civil divisions, $1,387,316,976; school districts, $461,188,015—total, $2,789,990,120; per capita of population, all debts, $35.50. A statement of the debts of the principal countries of the world, for official years in 1903–7, reduced to U. S. currency, gives an aggregate of $36,548,455,489, on which there was an annual interest (2 to 10 per cent) and other charges amounting to $1,550,433,038. In the same period the revenue of the principal countries was $8,971,287,021; expenditure, $8,988,727,487. France had the largest debt, $5,655,134,825; then came Russia, $4,038,199,722; United Kingdom, $3,839,620,745; German states, $2,957,356,846; Italy, $2,767,911,949; Spain, $1,820,265,995; Australian states, $1,128,632,767; British India, $1,127,923,363; Hungary, $1,102,742,776; Austria-Hungary, $1,092,863,255; Nicaragua, $6,330,739; Siam, $4,866,500; Salvador, $4,602,361; Bolivia, $2,977,924; Luxembourg had the smallest debt, $2,316,000.

Dec'alogue, part of the law of Moses contained in Ex. xx, 3–17 and repeated in Deut. v, 7–21. We are accustomed to speak of it as the "Ten Commandments" and the "moral law," but these terms are not applied to it in the original Scripture; the phrase there is "the ten words." The commandments, with the exception of the two regarding the Sabbath and reverence to parents, are negative ones, forbidding certain actions, and leaving positive precepts to other laws or to the individual conscience. The Decalogue is generally regarded as a moral code, binding from its own nature, though the Sabbath commandment has a positive as well as a moral element in it. Jews call them "the ten words." The Roman Catholic Church unites the first and second commandments, and divides the tenth into two. Modern Jews take Ex. xx, 2, as the first commandment, and combine Ex. xx, 3 and 4.

Decamps (dė-kăn'), **Alexandre Gabriel,** 1803–60; French genre and landscape painter; b. Paris; at first followed the classical traditions of David, but became with Delacroix and others a leader in the Romantic school of 1830. His "Caravan" and "Towing Horses" are in the Louvre; "Night Watch at Smyrna," in the Metropolitan Museum, New York; and "The Suicide," in the Walters collection, Baltimore.

De Candolle (dė kăn-dōl'), **Augustin Pyrame, M.D.,** 1778–1841; botanist of French extrac-

tion; b. Geneva; studied at Geneva and afterwards in Paris, where he became a pupil of Desfontaines, and enjoyed the friendship of Cuvier and Humboldt. Lamarck's "Flora of France" (1804–5) was prepared by him. He became, in 1808, Prof. of Botany at Montpellier, and published in 1813 his "Elementary Theory of Botany," a profound work, in which he developed his new system of classification according to the natural method. In 1816 he removed to Geneva. He projected a great work which should give a description of all known plants, and published two volumes (1818–21), with the title "Regni Vegetabilis Systema Naturale," but modified his plan and undertook the well-known "Prodromus Systematis Naturalis Regni Vegetabilis" (seventeen vols., 1824–73), which he did not live to finish. Died in Geneva.

Decap'oda, subclass of Crustacea, most of whose members are characterized by having ten walking feet. The limits of the group vary; as here used is equivalent to *Podophthalmia,* or stalk-eyed Crustacea. The body is divided into two regions, an anterior cephalothorax bearing the organs of sense, of eating, and of locomotion, and a posterior seven-jointed abdomen. The eyes are placed on jointed stalks; the walking legs are ten to fourteen in number. The group contains the largest and best known of the Crustacea.

Decap'olis, ten cities of Palestine, mostly Greek, leagued together, like the Hanse towns, and having certain privileges not now known. When Pompey conquered the East, 63 B.C., he annexed them to Syria, detaching them from the Judean Govt. Surrounded as they were by Jews, these cities then united in a defensive alliance. The original union was probably of Hippos, Pella, Gadara, and Scythopolis (on the W. side of the Jordan). Afterwards there were added Philadelphia, Gerasa, Dion, Raphana, Capitolias, and Canatha. Of these only Scythopolis, Gadara, and Canatha are now inhabited.

De Cassagnac (dė kä-sän-yäk'), **Adolphe Bernard Granier,** 1808–80; French journalist, historical writer, and politician; b. Averon-Bergelle; a zealous Bonapartist; editor of *Le Pays*; deputy in the Chamber of Deputies; works include "History of the Causes of the French Revolution," "History of the Directory."

De Cassagnac, Paul Granier, 1843– ; French journalist and Bonapartist politician; b. Paris; son of preceding; succeeded his father as editor of *Le Pays,* 1870; founded and became editor of *L'Autorité,* 1884; member of the Chamber of Deputies after 1876; concerned in numerous duels; author of "History of the Third Republic."

Deca'tur, Stephen, 1751–1808; American naval officer; b. Newport, R. I.; son of a Huguenot refugee; during the Revolution commanded the *Royal Louis* and *Fair American,* and captured several British vessels; May 11, 1798, hostilities with France having begun, was appointed post captain in the U. S. navy; was in command of the *Delaware,* which captured the privateers *Le Croyable* and *Marsuin*; in 1800 appointed to the command of a squadron on the Guadeloupe station; in 1801 was discharged from the service under the peace establishment, and engaged in business in Philadelphia.

Decatur, Stephen, 1778–1820; American naval officer; b. Sinnepuxent, Md.; son of the preceding; entered the navy, 1798; in 1804 led a small party which burned in the harbor of Tripoli the U. S. frigate *Philadelphia* after she had been captured by the Tripolitans; for this exploit was promoted captain; in same year added other deeds of valor to his record in the attacks of Tripoli by Preble's squadron; in command of the frigate *United States,* captured the British frigate *Macedonian,* October, 1812; for this victory Congress voted him a gold medal; appointed commander of a squadron to chastise the Algerines, 1815; captured two Algerine vessels of war, and compelled the Dey of Algiers to sue for peace; killed in a duel by Com. James Barron.

Decatur, capital of De Kalb Co., Ga.; 6 m. E. of Atlanta; scene of an engagement on July 20, 1864, between a Union force under Gen. Thomas and Confederates under Gen. Hood, resulting in defeat and retreat of the latter; Union loss in killed and wounded, 1,500; Confederate, estimated, 5,000. Pop. (1900) 1,418.

Decatur, capital of Macon Co., Ill.; 39 m. E. of Springfield; in the noted Illinois corn belt; has railroad car and repair shops; flour and planing mills; iron, engine, and boiler works; manufactures of furniture, carriages, linseed oil, and agricultural implements. Pop. (1906) 24,727.

Decazes (dė-käz'), **Élie** (Duc de), 1780–1860; French statesman; b. St.-Martin-du-Laye; became the trusted counselor of King Louis of Holland, and afterwards secretary to Letitia Bonaparte; went over to the Bourbons, 1814; Minister of Police, 1815; of the Interior, 1818; Prime Minister, 1819; tried to keep the balance between the Radical and Ultra-royalist parties, but was pleasing to neither; charged with complicity in the murder of the Duke of Berry; resigned; created duke, and sent as ambassador to England, 1820–21; after the revolution of 1830 supported Louis Philippe, and became Grand Referendary of the Chamber of Peers, 1834.

Decazes, Louis Charles Élie Armanien (Duc de), 1819–86; French statesman; b. Paris; son of the preceding; was minister to Spain and Portugal, 1848; retired to private life when the revolution of that year broke out; in 1871 was elected to the National Assembly; took his seat in the Right Center, but, though he generally followed his party, never openly and formally declared himself a monarchist; Minister of Foreign Affairs, 1873–77.

Dec'can, geographical term of historical importance; often applied to all that part of the peninsula of Hindustan S. of the Nerbudda River or Vindhya Mountains, or limited to the country between the Nerbudda and the Kistnah. It comprises Aurungâbâd, Bidar, Berar, Bijapur, Kandesh, Gundwana, N. Circars, and

Orissa. In 1325 the Mohammedans annexed to the empire of Delhi the whole country as far S. as the Kistnah. The name has been latterly applied to one of the larger political subdivisions of the presidency of Bombay.

Decem'ber, twelfth and last month of the year; so called because in the ancient Roman calendar it was the tenth month of the year. By the Anglo-Saxons it was called Yule month and Midwinter month.

Decem'viri (singular **Decem'vir**), ten magistrates elected 451 B.C. from the Roman patricians to draw up a code of laws founded on the more approved institutions of Greece; they were also invested with supreme authority to govern the state. Their laws were approved by the Senate and graven on ten metal tablets. A new commission, invested with the same power, was appointed for the next year, to which the plebeians were admitted; the result was two additional tablets, thus completing the famous Twelve Tables which became the foundation of all Roman law. The *decemviri litibus judicandis* (ten men for settling lawsuits) formed a kind of court for trying civil cases, and, later, for matters involving life and death. The *decemviri sacris faciundis* (the ten men for performing sacred duties), first instituted abt. 367 B.C., were five patricians and five plebeians who had charge of the Sibylline books until the time of Cicero, when they were made fifteen in number.

Deciduous (dē-sĭd'ū-ŭs) **Trees**, trees whose leaves fall in the autumn, leaving the branches bare of foliage during the winter. They are contrasted with the evergreens (*q.v.*), in which the leaves remain upon the branches until after the appearance of the new leaves in the spring. There are many gradations between the two kinds. A tree which is deciduous in a cold climate will be evergreen or nearly so in a warm climate.

Dec'imal Sys'tem. See METRIC SYSTEM.

Decima'tion, in Roman history, the selection by lot of one man out of every ten, to be put to death in cases of mutiny or other grave offense committed by a body of troops. Decimation has seldom been practiced in modern times.

De'cius, Caius Messius Quintus Trajanus, abt. 200–251; Roman general and emperor; b. Pannonia; sent, 249, by the emperor Philip to appease a sedition, his army revolted and proclaimed him emperor. Philip marched against him, but was killed in the battle which ensued. Decius himself was slain two years later, and his army defeated, while attempting to check the Gothic invasion.

Decius Mus, Publius, Roman consul and patriot who obtained celebrity by devoting himself to the Dii Manes as a sacrifice; in a battle against the Latins, 337 B.C., he rushed into the midst of the enemy and was killed. His son, P. Decius Mus, imitated his example, 296 B.C., when he commanded against the Gauls.

Deck, the floors of a ship; named from their situation and use; the upper deck of the old war ships was called the spar or main deck, below it was the gun or berth deck, below that the orlop deck. The part of the main deck back of the mainmast is still called the quarter-deck, and is reserved for the officers. The deck in the bow of the ship is the forecastle deck and is occupied by the crew. Modern ships have many superimposed decks, such as the hurricane, texas, bridge, etc.

Deck'er, Thomas, abt. 1570–1638; English dramatist; b. in London; wrote plays in collaboration with Ben Jonson, Webster, Middleton, and many others; was sole author of several plays. He also wrote a number of pamphlets chiefly satirizing English social life.

Declara'tion, affirmation; a public announcement; a proclamation. Among the most memorable of all political documents are the Declaration of Independence and the "Declaration of Rights" passed by the first Congress of the British N. American colonies at Philadelphia, October 14, 1774. The Convention Parliament of England adopted a "Declaration of Rights" on calling William and Mary to the throne in 1689. A "Declaration of the Rights of Man" was adopted by the National Assembly at Paris, August 18, 1789. The "Declaration of Thorn" was a confession of faith drawn up at Thorn, Poland, 1645, for the Reformed churches, the design being to settle controverted points.

Declaration of Independ'ence, act by which the British colonies of N. America asserted their independence of the mother country. On June 7, 1776, Richard Henry Lee, a delegate in Congress from Virginia, moved the resolution that "these united colonies are, and of right ought to be, free and independent states, . . . and that a plan of confederation be prepared and transmitted to the respective colonies for their consideration and approbation." This was adopted June 11th. Two committees were appointed under it—one to prepare a declaration of independence and the other to prepare articles of union or confederation. The committee to prepare the Declaration of Independence consisted of Thomas Jefferson, of Virginia; John Adams, of Massachusetts; Benjamin Franklin, of Pennsylvania; Roger Sherman, of Connecticut; and Robert R. Livingston, of New York. They reported, June 28th, a draft of such a declaration. This paper was submitted to Congress, and still stands, as drawn up by Jefferson, chairman of the committee, being only slightly modified in parts at the suggestion of other members. It came up for final action July 4th, when it received the unanimous vote, not only of all the colonies, but of all their delegates in Congress.

TEXT OF THE DECLARATION.

IN CONGRESS, July 4, 1776.

THE UNANIMOUS DECLARATION OF THE THIRTEEN UNITED STATES OF AMERICA.

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume, among the powers of the earth, the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident, that all men

are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that whenever any form of government becomes destructive of these ends, it is the right of the people to alter or to abolish it, and to institute a new government, laying its foundation on such principles, and organising its powers in such form, as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long established, should not be changed for light and transient causes; and accordingly, all experience hath shown, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security. Such has been the patient sufferance of these Colonies, and such is now the necessity which constrains them to alter their former systems of government. The history of the present King of Great Britain is a history of repeated injuries and usurpations, all having, in direct object, the establishment of an absolute tyranny over these States. To prove this, let facts be submitted to a candid world:

He has refused his assent to laws the most wholesome and necessary for the public good.

He has forbidden his Governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained; and, when so suspended, he has utterly neglected to attend to them.

He has refused to pass other laws for the accommodation of large districts of people, unless those people would relinquish the right of representation in the Legislature; a right inestimable to them, and formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable, and distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved representative houses repeatedly, for opposing, with manly firmness, his invasions on the rights of the people.

He has refused, for a long time after such dissolutions, to cause others to be elected; whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise; the state remaining, in the meantime, exposed to all the danger of invasion from without, and convulsions within.

He has endeavored to prevent the population of these States; for that purpose, obstructing the laws for the naturalization of foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new appropriations of lands.

He has obstructed the administration of justice, by refusing his assent to laws for establishing judiciary powers.

He has made judges dependent on his will alone, for the tenure of their offices, and the amount and payment of their salaries.

He has erected a multitude of new offices, and sent hither swarms of officers to harass our people and eat out their substance.

He has kept among us, in times of peace, standing armies, without the consent of our legislature.

He has affected to render the military independent of, and superior to, the civil power.

He has combined, with others, to subject us to a jurisdiction foreign to our constitution, and unacknowledged by our laws; giving his assent to their acts of pretended legislation.

For quartering large bodies of armed troops among us:

For protecting them, by a mock trial, from punishment, for any murders which they should commit on the inhabitants of these States:

For cutting off our trade with all parts of the world:

For imposing taxes on us without our consent:

For depriving us, in many cases, of the benefits of trial by jury:

For transporting us beyond seas to be tried for pretended offenses:

For abolishing the free system of English laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries, so as to render it at once an example and fit instrument for introducing the same absolute rule into these colonies:

For taking away our charters, abolishing our most valuable laws, and altering, fundamentally, the powers of our governments:

For suspending our own legislatures, and declaring themselves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, by declaring us out of his protection, and waging war against us.

He has plundered our seas, ravaged our coasts, burnt our towns, and destroyed the lives of our people.

He is, at this time, transporting large armies of foreign mercenaries to complete the works of death, desolation, and tyranny, already begun, with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the head of a civilized nation.

He has constrained our fellow-citizens, taken captive on the high seas, to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands.

He has excited domestic insurrections among us, and has endeavored to bring on the inhabitants of our frontiers, the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes, and conditions.

In every stage of these oppressions, we have petitioned for redress in the most humble terms; our repeated petitions have been answered only by repeated injury. A prince whose character is thus marked by every act which may define a tyrant is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them, from time to time, of attempts made by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them, by the ties of our common kindred, to disavow these usurpations, which would inevitably interrupt our connections and correspondence. They, too, have been deaf to the voice of justice and consanguinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them, as we hold the rest of mankind, enemies in war, in peace friends.

We, therefore, the Representatives of the United States of America, in General Congress assembled, appealing to the Supreme Judge of the world for the rectitude of our intentions, do, in the name and by the authority of the good people of these Colonies, solemnly publish and declare, That these United Colonies are, and, of right, ought to be, *free and independent States;* that they are absolved from all allegiance to the British crown, and that all political connection between them and the state of Great Britain is, and ought to be, totally dissolved; and that, as *free and independent States*, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which *independent States* may of right do. And, for the support of this Declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other, our lives, our fortunes, and our sacred honor.

MASSACHUSETTS BAY.
John Hancock,
Samuel Adams,
John Adams,
Robert Treat Paine,
Elbridge Gerry.

RHODE ISLAND.
Stephen Hopkins,
William Ellery.

CONNECTICUT.
Roger Sherman,
Samuel Huntington,
William Williams,
Oliver Wolcott.

NEW YORK.
William Floyd,
Philip Livingston,
Francis Lewis,
Lewis Morris.

NEW JERSEY.
Richard Stockton,
John Witherspoon,
Francis Hopkinson,
John Hart,
Abraham Clark.

PENNSYLVANIA.
Robert Morris,
Benjamin Rush,
Benjamin Franklin
John Morton,
George Clymer,
James Smith,
George Taylor,
James Wilson,
George Ross.

NEW HAMPSHIRE.
Josiah Bartlett,
William Whipple.
Matthew Thornton.

DELAWARE.
Cæsar Rodney,
George Read,
Thomas McKean.

MARYLAND.
Samuel Chase,
William Paca,
Thomas Stone,
Charles Carroll, of Carrollton.

VIRGINIA.
George Wythe,
Richard Henry Lee,
Thomas Jefferson,
Benjamin Harrison,
Thomas Nelson, Jr.,
Francis Lightfoot Lee,
Carter Braxton.

NORTH CAROLINA.
William Hooper,
Joseph Hughes,
John Penn.

SOUTH CAROLINA.
Edward Rutledge,
Thomas Heyward, Jr.,
Thomas Lynch, Jr.,
Arthur Middleton.

GEORGIA.
Button Gwinnet,
Lyman Hall,
George Walton.

Declaration of Independence, The Meck'lenburg. See MECKLENBURG DECLARATION OF INDEPENDENCE.

Declaration of Indul'gence, proclamation issued by James II granting religious toleration to Protestant and Roman Catholic Nonconformists, and ordered to be read in all the churches. It was expected to draw the Dissenters to the side of the king's Romanist policy, since they, in common with the members of the king's faith, were benefited by it, but opposition arose in all quarters; many of the clergy refused to read it, and at last seven bishops, headed by Archbishop Sancroft, presented the petition for the remission of the requirement that it should be read. Their trial followed on the charge of seditious libel, and, amid the most intense excitement, resulted in their acquittal. The effect of the declaration was to consolidate the opposition and precipitate the revolution of 1688.

Declaration of Par'is, declaration made by the delegates to the Congress of Paris, 1856, in regard to privateering, blockades, etc., as follows: (1) Privateering is and remains abolished. (2) A neutral flag covers enemy's goods, with the exception of contraband of war. (3) Neutral goods, with the exception of contraband of war, are not liable to capture under an enemy's flag. (4) Blockades, in order to be binding, must be effective—that is to say, maintained by a force sufficient really to prevent access to the coast. The declaration was not to be binding, except between those powers who acceded or should afterwards accede to it. It has since been acceded to by all important maritime countries except Spain, the U. S., and other American states. On entering into war in 1898 the U. S. and Spain proclaimed the intention to observe the principles of the Declaration of Paris.

Declaration of Rights, state paper presented to the Prince and Princess of Orange (afterwards William III and Mary II) at the time the crown was tendered to them (February 13, 1689). The declaration had been drawn up by the Convention Parliament, and complained of grievances which England had endured during the reign of James II: The establishment of illegal ecclesiastical tribunals, unlawful taxation, interference with the courts and the elections, the infliction of barbarous punishments, and the refusal to hear petitions. The substance of this declaration became the Bill of Rights.

Declaration of War, formal announcement by one government of its intention to wage war against another. Since the universal use of the telegraph in political correspondence and for conveying the news of the world, the events leading up to a war are so widely known that a formal declaration is unnecessary, and may be omitted without designing to take an enemy unawares. It is customary, however, for each belligerent at the outbreak of war to issue manifestoes (1) to its own subjects, to inform them of the impending change and its risks to their property; and (2) to neutrals, to make known the principles and rules of war which will be enforced. In the U. S. the declaring of war is a power exercised by Congress alone.

Declination (dĕk-lĭ-nā'shŭn), in astronomy, the angular distance of a celestial body from the celestial equator; measured along a great circle passing through the center of the body and the poles of the heavens; or it may be defined to be the arc of a circle of declination passing through the place of the heavenly body, intercepted between that place and the celestial equator. The place of a star in the heavens is determined by means of its right ascension and declination, which correspond to longitude and latitude on the surface of the earth.

Dec'orated Style, that phase of English Gothic architecture which succeeded the Early English abt. 1285, and gave way in turn to the Perpendicular about seventy-five years later. Its structural forms are more slender and elaborate than in the preceding period, and profusely decorated with naturalistic foliage and other carved enrichments.



DECORATED ROMAN MOLDING.

Decora'tion Day, in the U. S., the day set apart to the memory of the soldiers and sailors who fell in the Civil War of 1861–65; is observed by processions and orations in honor of the dead, and by decorating the graves with flowers. The day observed at first differed with the various states, but usage has settled on May 30th, a legal holiday in most states. The name of the day so set apart has in recent years been changed to Memorial Day. In the South various days in April are set apart for decorating the graves of the Confederate dead, and the name Memorial Day is more commonly used there than Decoration Day.

Dec'orative Art, fine art applied to the ornamentation of objects which exist for other purposes than beauty. Thus the hilt of a sword, consisting of grip, pummel, guard, etc., needs no ornament, having a beauty of its own from the fitness of its parts and the color of the metal, etc.; but if it receives embossing and chasing, or damaskeening, or even an elaboration of form not required by utility, then the fine art employed in beautifying it in these ways is decorative art. Decorative art may be divided as to the materials employed or as to the articles and objects adorned. Usually a

twofold classification is adopted. Thus in a great collection, now dispersed, the classification was under thirty-six heads for mediæval or later objects alone. Sometimes the material determines the title, as leather work or ivory carvings; sometimes the destination of the objects, as arms and armor, or coins, medals, and counters, or church goldsmiths' work. To this list of the classes of European objects for a term of eight or nine centuries only would have to be added the lacquers of Oriental art, the lapidaries' work in very hard and costly stones of both Oriental and W. nations, bookbinding, the mosaics of antiquity and the Middle Ages, the architectural inlays of stones, etc., of different colors, the glazed and other pottery used in architecture, the painted cases of the Greeks and their imitators, the painting of architecture in bright colors used by Egyptians, Greeks, and mediæval artists alike, and architectural sculpture, in all ages and all lands. The chief of the decorative arts, or the chief manifestation of decorative art, is architecture—that is, the making a work of fine art of a building which, if purely utilitarian and without any application of fine art to it, would be equally useful as a building; but the kind of fine art used in making a building beautiful by the proportion of its parts, its graceful form, its picturesqueness or its tranquil majesty, its lightness or its ponderous solidity; and also by means of the leafage, the animal or other forms added to it in relief, inlay, etc., is exactly the same as that used in the sword hilt.

De Cos'ta, Benjamin Franklin, 1831–1904; American historian; b. Charlestown, Mass.; entered Episcopal ministry, 1857; Roman Catholic, 1900; editor *The Christian Times, The Episcopalian, The Magazine of American History*; books include "Pre-Columbian Discovery of America by the Northmen," "Sailing Directions of Henry Hudson," "Verrazano, the Explorer."

Decoy', any means used to entice game into a trap or within gunshot. In England trained live ducks are fed so as to get the habit of entering a net laid like a tunnel, and wild ducks, impelled by curiosity, follow these decoys, and then are driven up the gradually narrowing funnel of the net. Painted imitations of ducks of wood or metal are used in the U. S. to bring wild ones within range. Caged song birds are used to attract others, and stool pigeons, with their eyes stitched up, were formerly placed above traps as a lure to other birds.

Decre'tal, letter of the pope determining some point in ecclesiastical law. The canon law ("Corpus Juris Canonici") consists of the following parts: "The Decretum of Gratian," 1139–59; "The Five Books of the Decretals of Gregory IX," 1234; "The Liber Sextus of the Decretals of Boniface VIII," 1298; "The Collection of the Constitutions of Clement V," 1314–17; "The Extravagantes (additional decretals) of John XXII," 1325; "The Extravagantes Communes" (published 1500, authenticated 1580). The above collections had the official recognition of Gregory XIII, July 1, 1580. To them is to be added later legislation of popes, councils, and Roman congregations.

Decretals, False, or Pseu'do-Isido'rian Can'ons, collection of papal letters, canons of councils, etc., both genuine and spurious, made in the ninth century by an unknown author, though in the preface they are ascribed to one Isidorus Mercator (Peccator, according to some MSS.). There are about 100 false decretals under the names of the earlier popes from Clement I (d. abt. 100 A.D.) to Siricius (384–98). The aim of this collection was to free the bishops from the oppression of the metropolitans, themselves under the influence of the Carlovingian kings. Some Protestant writers have maintained that the primacy of the popes is based upon the false decretals; while Roman Catholic writers point to the history of Leo the Great, Gregory the Great, and other popes to show that this position was already acknowledged by the Church.

Decu'rion, Roman cavalry leader of a *decuria*, or body of ten men. Three *decuriæ* constituted a *turma*, or body of thirty men, and the name decurio was afterwards given to the commander of the larger body. There were also civil officers called decurions who during the republic constituted the executive authority in the Italian municipalities.

Dedica'tion, Feast of the, Jewish feast commemorating the purification of the Temple after its pollution by Antiochus Epiphanes, 167 B.C., and the rebuilding of the altar of burnt offerings by Judas Maccabæus, after he had driven the Syrians out of Jerusalem, 164 B.C. (cf. 1 Mac. iv, 42–50); was kept eight days, and very joyously. It is only once referred to in the New Testament (John x, 22). The use of lights was one of the characteristics of the festival.

Deduc'tion, mental operation which consists in drawing a particular truth from a general principle already known. It is opposed to induction, which consists in rising from particular truths to the determination of a general principle. The syllogism is the form of deduction. Before we can deduce a particular truth we must be in possession of the general truth. The mathematical and metaphysical sciences are founded on deduction; the physical sciences rest on induction. See INDUCTION.

Deed, writing on paper or parchment, sealed and delivered; particularly an instrument for the conveyance of real estate. According to Coke, it should possess the following requisites: Writing, parchment or paper, a person able to contract, a sufficient name, a person able to be contracted with, a sufficient name, a thing to be contracted for, apt words required by law, sealing, and delivery. Deeds pursue a regular form—containing the premises, *habendum, tenendum, reddendum,* conditions, warranty, covenants, and conclusion. A deed may be either an indenture or a deed poll. The leading distinction between these terms is that an indenture purports to be the act of both parties, a deed poll of only one. By statute in

the U. S. and elsewhere the verbose deeds of the common law have been largely superseded by simpler conveyances.

Deem'sters, or Demp'sters, two chief judges in the Isle of Man, one of whom presides over the N. division of the island, the other over the S. Formerly in Scotland a dempster or doomster was an officer, connected with the high court of justiciary, who pronounced sentence on condemned persons.

Deep Bot'tom, locality on the N. side of James River; Henrico Co., Va.; 12 m. by land and 20 m. by water below Richmond; opposite the peninsula of Jones' Neck, between Three Mile and Four Mile creeks, and near the battle ground of Malvern Hill; was an important strategic point during the Civil War; occupied by part of the troops of Gen. B. F. Butler, June 20, 1864, and a pontoon bridge was thrown across the river; several actions were fought near Deep Bottom in August and September, 1864, the general result being favorable to the Union forces.

Deep Riv'er, in N. Carolina; flows SE. through Randolph Co., and nearly E. through Chatham Co., until it enters the Cape Fear River at Haywood; coal abounds on its banks; length, estimated 120 m.

Deep Sea Explora'tion. The limits of the region known as the "deep sea" have been differently defined at different periods of its exploration. To navigators for over a century the 100-fathom lead line has been known as the "deep-sea lead," and the general understanding of the term "deep sea" was 600 ft. or more. At present oceanic depths are divided as follows: (1) The region to which light can penetrate and, therefore, in which marine plants can grow, and animals, subsisting only on marine plants, can live; this extends from the shore seaward to a depth varying in different regions, as it depends on the translucency of the water and the average angle of the sun's rays, but its extreme seaward margin is at about the 100-fathom depth. This area is known as the littoral region. (2) From the seaward edge of the littoral region the sea bottom slopes to the ocean floor, which is on an average 2,500 fathoms, and extends in a gently undulated or level plain over vast areas. The latter is known as the benthal or abyssal region, while the intermediate area, chiefly on the continental slopes between the littoral and abyssal areas, had been named the archibenthal region. The region comprised under the name "deep sea" includes the abyssal and archibenthal areas.

Excluding isolated experiments or inconclusive instances of the capture of living animals from the abysses, the first systematic exploration of the deep sea was carried on by the Norwegians, led by Prof. O. Sars, in the archibenthal region of the N. of Europe. In 1867 the U. S. Coast Survey officers, Pourtalès and Mitchell, began systematic explorations in the Straits of Florida, reaching 850 fathoms. The most important researches of the English are the voyages of the *Lightning*, *Porcupine*, *Shearwater*, and *Valorous*, by which the Mediterranean and N. Atlantic regions were explored under the direction of Wyville Thomson, Carpenter, and Gwyn Jeffreys, 1868–72, and the voyage of the *Challenger* under Nares and Thomson, 1873–76, during which all parts of the ocean were visited and observations made at 360 stations. France, with the *Travailleur*, 1880–81, and the *Talisman*, 1883, explored the E. N. Atlantic and part of the Mediterranean. Norway continued her work in the boreal Atlantic in the *Voringen*, 1876–78, and Italy explored the abysses of the Mediterranean in the *Washington*. In the U. S. work has been more continuous than elsewhere. The coast-survey work of 1867 was continued, 1868 and 1869, in the *Bibb*, while in the *Blake*, by the cooperation of Agassiz, Sigsbee, and Bartlett, 1877–80, most important results were obtained. The U. S. Fish Commission steamers *Albatross* and *Fishhawk* have been engaged since 1872 in work on both shores of both Americas, and the navy has borne a most important part in the work in both oceans. The greatest reliable depths were found by the English *Challenger*, 1875, about 70 m. SE. of Guam Island, 4,475 fathoms, and the U. S. *Nero*, 1899, near the same point, 5,269 fathoms. See OCEAN.

Deer, common name for the *Cervidæ*, a group of ruminating mammals characterized by the presence in the males of solid bony horns or antlers, which are shed and renewed annually. Antlers start as soft lumps on the forehead, grow rapidly, and attain their full size in about three months. In the early stages they are spongy, full of blood vessels, covered with



SPOTTED AXIS (A. MACULATOR).

short hair, and are said to be in the velvet. Having attained their growth, the circulation of blood stops, the antlers harden, and the skin is rubbed off against trees. The first antlers of the young deer show in the second year as short spikes, and become branched in the third or fourth year; but while the number of branches increases with age up to a certain point, they afford no certain indication of age. The antlers are carried for four months or so, and are then broken off near

the skull, just below the "burr." Antlers are sometimes borne by the females, as in the reindeer, and are absent in the males of the musk deer. Deer are found in N. and S. America, Europe, and Asia, this last region, with its large outlying islands, containing the greatest number of species. No deer occur in Australia or Madagascar, and none in Africa S. of the Sahara, while the two species found in NE. Africa, the fallow deer and stag, are stragglers from Europe. The common deer of



American Deer (Cariacus Virginianus.).

the U. S. is the Virginia deer, known in the West as the white-tailed deer; found throughout the U. S., in N. Mexico, and in parts of Canada and British Columbia. Specimens from the extreme N. are much the largest and most powerful, examples from warm S. localities being quite small. The mule deer, distinguished from the preceding by its greater size, black-tipped tail, large ears, absence of brow antlers, and forking of the hinder branch, ranges from Minnesota to the Pacific, and from the latitude of Cape St. Lucas to British Columbia. The black-tailed deer, a closely related but smaller species, is confined to the Pacific coast of the U. S. and British Columbia W. of the Sierra Nevadas. See Elk; Moose.

Deer'field, town in Franklin Co., Mass.; on the Connecticut River at its junction with the Deerfield; 33 m. N. of Springfield; contains the village of S. Deerfield, which was the scene of several contests with the Indians in colonial times; among them, the "Bloody Brook massacre" (1675), and the burning of the village by the French and Indians under De Rouville (1703). Old Deerfield has a soldiers' monument, and there is at S. Deerfield a marble monument commemorative of the Bloody Brook disaster.

Deer Mouse, or **Jump'ing Mouse,** small mouse of the family *Dipodidæ*. The body is about 4 in. long, the tail somewhat more, and the hind legs are longer than the fore; the color is yellowish above, white below. This mouse is very active. It is generally distributed throughout the woodlands of N. America N. of Mexico. Deer mouse is also applied to several mice of the genus *Hesperomys* and family *Muridæ*. The best-known species is the white-footed mouse, which is widely distributed in N. America. This mouse is smaller than the other. The color is grayish or yellowish brown above, white below; the feet white.

Deffand (dā-fäṅ'), **Marie de Vichy-Chamrond** (Marquise du), 1697–1780; French literary woman; married, 1718, to the Marquis du Deffand, but soon separated from him. She was beautiful, witty, accomplished, a skeptic and an egotist. Her house in Paris was frequented by many eminent authors and statesmen. She corresponded with Voltaire, Horace Walpole, and D'Alembert, and wrote letters which are commended for style.

Deflec'tion, in architecture and engineering, the bending or depression of a horizontal beam caused by its own weight or that extraneously imposed upon it; also the amount of such deviation from its original form.

De Foe, Daniel, 1661–1731; English novelist and political writer; b. London; joined the rebellion of the Duke of Monmouth, 1685; produced in 1701 "The True-born Englishman," a satirical poem, designed to vindicate William III; and in 1703 an ironical pamphlet, "The Shortest Way with the Dissenters," for which the House of Commons punished him with the pillory, a fine, and imprisonment; conducted a newspaper, *The Review,* 1704–13; member of a commission sent to Scotland in 1706 to promote the union of the two countries; again fined and imprisoned for a political writing, 1713; published his most popular work, "Adventures of Robinson Crusoe," 1719; other works include "History of the Union," "Memoirs of a Cavalier," "Journal of the Plague Year," "History of Col. Jack."

De For'est, John William, 1826–1906; American author; b. Seymour, Conn.; served in the Civil War; settled in New Haven, Conn.; author of "The History of the Indians of Connecticut," 1853; "Oriental Acquaintance," 1856; "European Acquaintance," 1858, and a number of novels, including "Miss Ravenel's Conversion," 1867; and "The Oddest of Courtships," 1881.

Degenera'tion, those cases of evolution where the line of descent takes apparently a backward direction. In most cases the line is from the simple to the complex; the adult is more differentiated than the embryo, the offspring higher than the ancestor. Frequently there is variation in the opposite direction, and then, by favorable circumstances, these retrograde modifications are accumulated in successive generations to such an extent that the degeneration is evident. Degeneration is to be regarded as the result of removal from the conditions normal to the group and exposure to those entirely different. Thus in the parasitic Crustacea, as the organs of locomotion are no longer necessary, the legs are lost and the mouth changes from a chewing organ to one adapted to sucking the body fluids of some fish.

De Giers, Nicholas Carlovitch, 1820–95; Russian statesman; entered the Asiatic Department of Foreign Affairs at the age of eighteen; ambassador to Persia, 1863–69; to Switzerland, 1869–72; to Sweden, 1872; adjunct to the Minister of Foreign Affairs and director of the Asiatic Department, 1875; several times had charge of the Ministry of Foreign Affairs in the absence or illness of Gortchakoff, whom he succeeded as minister, 1882; especially prominent in his policy in connection with the conflict between Russia and Great Britain in Asia.

Degree', one of a series of progressive steps; also one of the unitary divisions of a scale of measurement. DEGREE IN ALGEBRA, the magnitude of the greatest sum that can be formed by adding together the exponents of the facients or variables which occur in any single term of an equation or expression. The terms *degree* and *order* are frequently used synonymously in algebra, but have distinct meanings when applied to differential equations. DEGREE OF LATITUDE, the distance N. or S. between two places on the same meridian at which plumb lines would make an angle of 1° with each other. DEGREE OF LONGITUDE, the distance between two places of the same latitude, the planes of whose meridians make an angle of 1° with each other. DEGREE IN MUSIC, one of the lines or spaces of the staff upon which the notes are marked. When notes are on the same line or space, they are on the same degree, even though one of the notes should be raised by a sharp or lowered by a flat. DEGREE IN TRIGONOMETRY, a unit of measurement for arcs of circles and for angles subtended by them; the 360th part of the circumference of a circle, or the 90th part of a right angle. A degree is subdivided into sixty minutes, and each minute into sixty seconds. The notation employed for an angle of six degrees fifty-two minutes and sixteen seconds is 6° 52′ 16″. A division of the quadrant into 100 parts, called *grades,* is of French origin, and is sometimes used. Each grade is divided into 100 minutes, and each minute into 100 seconds. These minutes and seconds, called "centesimal," are denoted by ′ and ″.

Degrees, scholastic distinctions. These fall under two classes. First, those which are given as a testimonial of the completion of a certain prescribed course of study; and, second, honorary degrees conferred by the faculty and trustees of institutions of learning upon persons of distinction. Originally the degree signified simply that the holder was qualified to teach in a university. The master's degree was the one first employed; at the Univ. of Bologna, in the twelfth century, the degree of doctor apparently was substituted for it. The mediæval university included the four faculties of arts, law, medicine, and theology. The term master gradually became restricted to the teacher in the first of these, and that of doctor to the other three. The pope, the recognized head of all universities, granted the right to confer degrees during the Middle Ages. The government in modern states confers this right on institutions by charter. The degree of bachelor is now usually granted at the completion of a four years' course of collegiate study. The degree of master requires a period of graduate study thereafter. The degree of doctor, regarded as the highest academic distinction, is the only degree conferred by the German universities, except that of licentiate, conferred by theological faculties. Such degrees as Doctor of Medicine, Civil Engineer, Doctor of Dental Surgery, etc., denote the fitness of the possessor to practice his profession.

De Grey, Earl. See RIPON, MARQUIS OF.

De Groot, Hugo. See GROTIUS, HUGO.

De Haas, Maurice Frederick Hendrick, 1832–95; Dutch-American painter; b. Rotterdam, Holland; pupil of Louis Meyer; gave much attention to marine painting, in which he early acquired distinction; in 1857 appointed artist to the Dutch navy; 1859, removed to New York; best-known work, "Farragut Passing the Forts."

Dei Grat'ia, "by the grace of God," formula which many European sovereigns add to their title; taken from an expression of the apostle Paul in the New Testament.

Dei'mos and Pho'bos, names respectively of the outer and inner satellites of Mars, discovered by Prof. Asaph Hall, 1877, with the 26-in. equatorial of the Washington Observatory.

De'ists, loosely defined body of thinkers having their principal development in England from the last part of the sixteenth century to the middle of the eighteenth. They rejected revelation because man's natural reason seemed to them adequate to assure him of the existence of God and the right form of worship. They rejected the Trinity, the deity of Christ, vicarious atonement, the supernatural or infallible inspiration of the Scriptures. In general, they regarded the Scriptures as made up of higher and lower things, the former a republication of natural religion, the latter the additions of the crafty and the superstitious. Lord Herbert, of Cherbury (1581–1648), called the "Father of Deism," expressed the positive aspects of the system, but dealt little in negation.

Dejani'ra, in Greek mythology, daughter of Œneus, King of Ætolia, and wife of Hercules. She preserved some blood of the centaur Nessus as a love charm, with which she saturated a tunic of Hercules, who was poisoned by wearing it.

De Kalb', John, 1721–80; American general; b. Hüttendorf, Bavaria; served first in the French army, becoming brigadier general; came to the U. S. with La Fayette, and was appointed major general by Congress, in 1777; served under Washington in Pennsylvania and New Jersey until 1780; then became second in command in the army of Gen. Gates; mortally wounded at the battle of Camden, S. C. Many counties and towns in the U. S. were named after him, and a bronze statue of him was unveiled at Annapolis, Md., 1886.

Dek'kan. See DECCAN.

Delacroix (dė-lă-krwä'), **Ferdinand Victor Eugène,** 1799–1863; French figure painter; b. near Paris; the founder of the romantic school, especially by his "The Massacre in Scio." His "Death of Sardanapalus," to which M. Thiers first called attention, brought 6,000 fr. in 1845, and 96,000 fr. in 1873. His best-known pictures include "Dante and Vergil," "Mephistopheles Appearing to Faust," "The Prisoner of Chillon," "Women of Algiers," and "The Entry into Constantinople."

Delago'a Bay, largest bay on the SE. coast of Africa; 55 m. long, about 25 m. wide; formed by the Indian Ocean; discovered by Vasco de Gama, 1498, and shortly after the Portuguese founded the trading post of Lourenço Marques. It seemed as if the Portuguese exercised no jurisdiction in the country, and, 1822, Capt. Owen hoisted the British flag and appropriated the territory; but on his return, 1823, he found the Portuguese governor in possession of the country, and strife began. The question attracted no attention, however, until 1868, when the country was annexed by the Transvaal Republic, which the Boers had founded in 1835. The case was then laid before the president of the French Republic for arbitration, and, 1875, Pres. MacMahon declared in favor of the Portuguese claim. A railway to Pretoria, begun by British and American capital, was confiscated by Portugal, 1889. The question of indemnity was submitted for arbitration to the Swiss Federal Council, 1891, and in 1900 Portugal was ordered to indemnify the original concessionaires to the extent of £28,000 plus 15,314,000 fr., with simple interest at five per cent from June 25, 1889, the date of the seizure.

Delambre (dė-läN-br'), **Jean Baptiste Joseph,** 1748–1822; French astronomer; b. Amiens; produced "Tables of the Orbit of Uranus," 1790, and "Tables of Jupiter's Satellites," 1792. In the service of the government Delambre and Méchain spent seven years (1792–99) in the measurement of the arc of the meridian from Dunkirk to Barcelona. Delambre was admitted into the Institute, 1795; perpetual secretary of the Academy of Sciences, 1803; Prof. of Astronomy in the College of France, 1807; works include a "History of Ancient Astronomy," 1817; a "History of Mediæval Astronomy," 1819; and a "History of Modern Astronomy," 1821.

Delane', **John Thaddeus,** 1817–79; English journalist; b. London; editor of the *Times,* 1841–77, during which time the paper attained an influence unparalleled in the history of journalism.

Del'ano, Columbus, 1809–96; American lawyer; b. Shoreham, Vt.; removed in youth to Ohio; practiced law; elected to Congress, 1844; having joined the Republican Party, was again elected to Congress, 1864; Commissioner of Internal Revenue, 1869; Secretary of the Interior, 1870.

De la Ramée (dė lă rä-mā'), **Louisa,** 1840–1908; British novelist of French extraction (known in the literary world as "Ouida"); b. at Bury St. Edmunds. Her pseudonym was a childish mispronunciation of "Louisa." Her novels are popular, but sensational and high-colored fictions. Some of them are "Strathmore," 1865; "Under Two Flags," 1867; "In a Winter City," 1876; "In Maremma," 1882; "Guilderoy," 1889. She resided in Italy for many years.

Delaroche (dė-lă-rōsh'), **Hippolyte** (called PAUL), 1797–1856; French historical painter; b. Paris; pupil of Gros; grand gold medal, Salon, of 1824; officer Legion of Honor, 1834; member of the Institute, 1832; professor at the École des Beaux-Arts; painted the famous "Hemicycle," in the École; "Charlemagne Crossing the Alps," in the Versailles Museum; and "The Princes in the Tower" and the "Death of Queen Elizabeth," in the Louvre; was a pronounced classicist.

De la Rue, Warren, 1815–89; English physicist and inventor; b. in Guernsey; invented processes for photographing the heavenly bodies, improvements in color printing, in envelope-folding machines, in oil refining, etc., and published reports of original observations in chemistry, astronomy, and physics.

Delaunay (dė-lō-nā'), **Charles Eugène,** 1816–72; French astronomer; b. near Troyes; taught for twenty-five years in the Polytechnic School, Paris; Prof. of Astronomy and Geology, 1871; succeeded Leverrier as director of the Observatory, 1870; admitted to the Academy, 1855; chief work, "Theory of the Moon's Movements," two volumes, 1866–67, which served the Institute as a basis for new tables.

Delavigne (dė-lă-vēñ'), **Jean François Casimir,** 1793–1843; French dramatist; b. Havre; after the Restoration he wrote a series of patriotic lyrics called "Messéniennes," which were received with favor; dramas, "Les Vêpres Siciliennes," 1819; "Les Comédiens," 1820; and "Le Paria," 1821, increased his fame; occupies an intermediate position between the classical and the romantic school.

Del'aware, named after Lord Delaware, Governor of Virginia; popularly called BLUE HEN STATE and DIAMOND STATE; state flower, peach blossom; state in the S. Atlantic division of the N. American Union; bounded by Pennsylvania, Delaware River and Bay, the Atlantic, and Maryland; area, 2,050 sq. m.; pop. (1906) 194,479; surface in the N. diversified by hill and dale; S. of Christiana Creek almost a perfect level, but a sandy ridge, nowhere above 70 ft. in height, runs near the W. boundary and forms the watershed of the state; most important streams, the Brandywine and Christiana creeks, which unite below Wilmington; only good harbors, Wilmington, New Castle, and Lewes. Minerals, granite, furnace and molding sands, bog iron-ore, shell marl, and Kaolin or porcelain clay. Soil for 8 or 10 m. inland from Delaware Bay is for the most part a rich clayey loam, but W. of this sandy. Climate mild and favorable for farming; healthful in the N. and center. Peaches, apples, and small fruits raised here are in demand in the New York and Philadelphia markets; other

products include corn, wheat, oats, hay, potatoes, sweet potatoes, and all garden vegetables. Principal manufactures, iron, mostly rolled, flour and meal, morocco and leather; shipbuilding, iron and wood; machinery, car wheels, etc.; railway and horse cars; cotton goods, paper, powder and chemicals, carriages and wagons; canned provisions, vegetables, and fruits; tobacco, cigars, cigarettes, and snuff.

The U. S. census of 1905 reported 631 factories, having $50,925,630 capital, and annual products valued at $41,160,276. Foreign commerce is conducted mostly through Philadelphia and Baltimore. Wilmington is the port of the Delaware district. The Chesapeake and Delaware Canal, in the N. part of the state, connects by a canal navigable for coasting vessels the waters so called. There are normal schools, agricultural and mechanical colleges, and at Newark, Delaware College; leading religious denominations, Methodist, Roman Catholic, Presbyterian, Protestant Episcopal, and Baptist. Principal towns, Wilmington (largest city), Dover (capital), New Castle, and Smyrna. North Milford, Seaford, Lewes, Laurel, Delaware City, South Milford, Georgetown, and Newark are important towns.



SEAL OF DELAWARE

Delaware was first settled by the Dutch, near Lewes, 1630; settlement destroyed by Indians; settled by Swedes and Finns, 1637, and region called New Sweden; territory captured by the Dutch, 1655; Delaware purchased by William Penn, 1685; was regarded as a part of Pennsylvania for twenty years; had a distinct legislature, 1703, but until 1776 was under the Pennsylvania government, the Penn family being proprietaries; became independent, 1776, and one of the original thirteen states; in the Revolution (and previous wars) its soldiers called the "Blue Hen's Chickens," from the flag they carried. State held a few slaves till the Civil War.

Delaware Bay, wide estuary between the mouth of the Delaware River and the Atlantic, separating Delaware from New Jersey; entrance between capes May and Henlopen is 13 m. wide; greatest breadth, about 25 m. A safe and capacious harbor has been formed here by the construction of a noted breakwater near Lewes.

Delaware Riv'er, river of the U. S.; rises in New York; formed by the Coquago and the Popacton, which unite at Hancock on the boundary between New York and Pennsylvania; flows SE. to Port Jervis, and reaches the N. extremity of New Jersey. Below this point it forms the boundary between Pennsylvania and New Jersey, and runs SW. to Delaware Water Gap, where it passes through a picturesque gorge in the Kittatinny Mountain. Thence it flows SE. to Trenton, where it meets tide water. Below Bordentown it flows SW. until it enters Delaware Bay, about 40 m. below Philadelphia; length, about 300 m.; is navigable for steamboats to Trenton, and ships of the largest size can ascend to Philadelphia, where it is nearly a mile wide. It is connected with the Hudson River by the Morris and the Delaware and Hudson canals.

Delawares, confederacy of N. American Indians, formerly the most important of the Algonquian stock, occupying the entire basin of Delaware River in E. Pennsylvania and SE. New York, together with most of New Jersey and Delaware; called themselves Lenape, or Lenni-Lenape; the English knew them as Delawares, and the French called them Loups. The early traditional history of the Delawares is contained in their national legend, the "Walam Olum." They made their first treaty with William Penn, 1682, and then had their great council fire on the site of the Germantown section of Philadelphia. They now number abt. 1,900, in Indian Territory, Oklahoma, Kansas, Wisconsin, and Ontario, Canada.

Delaware Wa'ter Gap, summer resort of Monroe Co., Pa.; on the Delaware River, where it passes through the Kittatinny Mountain; 108 m. N. of Philadelphia, and 92 m. W. of New York; the river here flows through a narrow gorge between steep, rocky banks, which rise nearly 1,200 ft.

Delawarr', Thomas West (Lord), d. 1618; twelfth baron of that title; second governor and first captain general of Virginia; descendant of an old noble family which derived its name from an estate called La Warre (or Warwick), in Gloucestershire, England. He was named captain general of Virginia (which comprehended nearly all the present E. coast of the U. S.) in a charter dated May 23, 1609; visited the colony, 1610; established a post at the mouth of the James; built two forts, and returned in the following year to England; expended large sums of money in establishing the colony of Virginia; d. at sea while on his second voyage to America.

Delcassé (dĕl-kăs-sā'), **Théophile,** 1852– ; French statesman; b. Pamiers, Ariège. He made his début as a journalist; first became prominent in public affairs as Under Secretary, then Minister of the Colonies, 1893–95, and was then Minister of Foreign Affairs. In 1899 he acted as mediator between the U. S. and Spain, and took a leading part in the negotiations with China following the Boxer

troubles. In 1904 he carried through an important agreement between France and Great Britain.

Del Cred'ere Commis'sion, an additional premium charged by a factor or commission merchant on the price of goods consigned to him when he guarantees the solvency of the purchaser who buys them on credit.

Delega'tion, name formerly given in Lombardy and Venice and in the papal dominions to a province and its governor and his court. There were nine of these governing bodies in Lombardy and eight in Venice, each consisting of a delegate as president, a vice president, and subordinates. In 1816 there were seventeen delegations in the states of the Church, but the numbers were several times changed. Here the delegate was always a prelate appointed by the pope; if a cardinal, he was called a legate and his province a legation.

Delescluze (dė-lā-klüz'), **Louis Charles,** 1809–71; French politician; b. Dreux; took part, 1830, in the republican movement; was, after the revolution of 1848, commissioner general in the departments Du Nord and Pas-de-Calais; deported to Cayenne, 1857. In 1868 he started a journal, *Reveil,* which advocated the views of the International, a socialist organization of working men, and caused him more trouble with the government. During the Commune, of which he was the leading spirit, he was at the head of the war commission with almost unlimited powers. His death, on the barricade in the Rue d'Angoulême, ended the resistance of the Commune.

Delft, town of the Netherlands, province of S. Holland; 4 m. SE. of The Hague; is well built amid a network of canals. It has a richly adorned town hall, a Gothic church containing a magnificent monument to William, Prince of Orange, who was assassinated here, 1584; arsenal, East Indian college, polytechnic school, and several hospitals. Delft was formerly noted for glazed earthenware, which throughout Holland came to have the name of delftware; it is now mostly made in England, but still called delf, or delft. Here are manufactures of carpets, woolen cloths, soap, etc. Its port, Delftshaven, was the starting point of the Pilgrim Fathers for Southampton, 1620. Pop. (1905) 32,950.

Del'hi, called by the Mohammedans SHAHJEHANÂBÂD, celebrated city of Hindustan; on the Jumna, 954 m. NW. of Calcutta; formerly the capital of the Mogul Empire, and the largest city of Hindustan, having a pop. of 2,000,000; extensive tract, covered with the ruins of palaces, pavilions, baths, and mausoleums, marks the dimensions of the ancient metropolis. The modern city, mostly rebuilt by Shah Jehan, 1638–58, has a circumference of 7 m., and is surrounded on three sides by walls of red sandstone 30 ft. high, with ten colossal arched gates, defended by round bulwarks.

The palace of the Great Mogul is the most magnificent in India. Its stupendous towers, surmounted by elegant pavilions, its marble domes and gilded minarets, present a very imposing appearance. Among other remarkable edifices is the Jamma mosque, a splendid structure in the Byzantine style, built of white marble and red sandstone. Delhi has about forty mosques, many of which have lofty minarets and gilded domes. The city was taken by the British, 1803, and has continued under their domination ever since. In May, 1857, Delhi was occupied by mutinous Sepoys, who murdered a number of British residents. An army commenced the siege of this place in June, and took it by assault, after a severe fight of seven days, in September, 1857. Pop. (1901) 208,575.

Delibes (dė-lēb'), **Clement Phillibert Leo,** 1836–91; French composer; b. Saint-Germain-du-Val; became accompanist at the Théâtre Lyrique, 1853, and at the Grand Opéra, 1863, second chorus master under Massé; a chevalier of the Legion of Honor; a member of the Institute, and Prof. of Composition in the Conservatory; most famous opera, "Lakmé," produced in Paris, 1883, with the American singer, Marie Van Zandt, in the title rôle.

Delilah (dė-lī'lä), woman of the Philistines; beloved of Samson; persuaded him to reveal to her the secret of his great strength, and when she learned that it lay in his hair never having been shorn, cut off his locks while he was asleep, and then delivered him to his enemies.

Delille (dė-lēl'), **Jacques,** 1738–1813; French poet; b. Auvergne; became Prof. of Humanities at Amiens; reputation established by a translation of Vergil's "Georgics"; published "Les Jardins," 1780; translated into French verse Vergil's "Æneid," 1804, and Milton's "Paradise Lost," 1805; his poem, "Imagination," 1806, has been highly commended.

Delir'ium Tre'mens, one of the affections produced by chronic alcoholism; occurs as a result of a protracted debauch in those habitually excessive in the use of alcoholic drink, more rarely as a result of a sudden withdrawal of the accustomed stimulus, or of a temporarily excessive indulgence; is frequently caused by some severe injury in a drunkard, or by acute disease. The symptoms of delirium tremens are varied, but the most important are wakefulness, loss of appetite, delirium, trembling, and hallucinations, which combine to exhaust the patient. The trembling is invariable, usually affecting the hands, but in some cases general. The hallucinations are generally grotesque or horrible visions (only occasionally of a pleasant nature), and usually combined with apprehensions of impending evil. Death from exhaustion occurs in about one sixth of bad cases.

The treatment consists in supporting the strength of the patient by nourishing soft food, with remedies to insure its retention; in inducing quiet and sleep by drugs, together with quiet surroundings. There is a craving for alcohol, but this is to be withheld, though, when weakness is marked, a little spirits may be allowed. See ALCOHOL, PHYSIOLOGICAL EFFECTS OF.

Delisle (dė-lēl'), **Guillaume,** 1675–1726; French geographer; b. Paris; reformed the

system of geography, and published, 1700, a map of the world and celestial and terrestrial globes; wrote several memoirs on geography, and produced maps of ancient and modern countries.

Delisle, Joseph Nicholas, 1688–1768; Franco-Russian astronomer; b. Paris; brother of preceding; founded a school of astronomy at St. Petersburg, and wrote an account of the Russian search for a passage from the S. Sea to the N. of America. In Delisle's thermometer, used in Russia, the boiling point of water is zero, and the freezing point is 150°.

Delitzsch (dā'lĭch), **Franz,** 1813–90; German theologian; b. Leipsic; Prof. of Theology at Rostock, 1846; at Erlangen, 1850; and at Leipsic, 1867; devotional and theological works include "The House of God," "History of Jewish Poetry," "Biblico-Prophetic Theology," "Biblical Psychology," "Christian Apologetics," "A Day in Capernaum"; wrote also valuable commentaries on Genesis, Isaiah, Psalms, Proverbs, Job, Song of Songs, and Hebrews; and prepared a translation of the New Testament into Hebrew.

Del'la Crus'ca, name of an academy founded at Florence, 1582, to establish a standard of the Italian tongue; published a dictionary, which became an authority on classical purity of language; was incorporated with the Florentine Academy, but was revived early in the nineteenth century.

De Long, George Washington, 1844–81; U. S. naval officer; b. New York City; graduated at Annapolis, 1865; served on the *Juniata* on her trip to the Arctic in search of the exploring ship *Polaris*, 1873; commander of the *Jeannette* expedition, 1879–81; perished with part of his crew on the delta of the Lena, Siberia; bodies and records later recovered by Chief Engineer Melville, U. S. N.; commander's journal published under title of "The Voyage of the *Jeannette*," 1883.

De'los, or Orty'gia, modern *Mikra Dilos*, small island in the Ægean, belonging to the group of Cyclades; celebrated as the birthplace of Apollo and Diana. According to tradition, it was originally a floating island, and was rendered immovable by Jupiter that it might be a place of refuge for Latona. It was the site of a famous temple and oracle of Apollo, and the center of a great periodical festival in honor of him. On the formation of the league against Persia, 477 B.C., Delos was chosen as the site of the common treasury of the Greek allies. In 426 B.C. Delos was purified by the Athenians, who removed all the tombs, and enacted a law to prevent it from being polluted by births or deaths. It was reputed one of the holiest places in Hellas. After the fall of Corinth (146 B.C.), Delos, which had a good harbor, was the center of an extensive commerce. Here was a town of the same name, now a mass of ruins. Shiploads of columns and other remains have been carried away to Venice and Constantinople. The island has an area of 32 sq. m., and is uninhabited.

Del'phi, ancient town of Phocis; one of the most celebrated places in the Hellenic world, on account of its oracle of Apollo; situated at the S. base of Mount Parnassus, in the narrow vale of the Pleistus, amid beautiful scenery; occupied the central area of a great natural theater or semicircular recess, partly inclosed by stupendous rocky barriers. The original or proper name of the oracle was Python. The oracles were uttered by a female called the *pythia*, who sat on a tripod placed over the mouth of a chasm. She is said to have breathed an intoxicating exhalation of vapor which issued from this chasm, and inspired her with the gift of prophecy. The Delphic oracle was silenced by the Emperor Theodosius. The site of Delphi is occupied by the modern town of Castri, or Kastri.

Delphi'nus, small but striking constellation visible in the S. in September. Four of its stars form a lozenge commonly called Job's coffin.

Delpit (dĕl-pē'), **Albert,** 1849–93; French author; b. New Orleans, La.; became a journalist in Paris; served with distinction in the war with Prussia; wrote plays, including "Barefoot John"; novels, including "Companions of the King" and "The Last Gentleman"; and volumes of verse, including "The Invasion."

Delsarte (dĕl-särt'), **François Alexander Nicolas Chéri,** 1811–71; French musician and investigator; b. Solesmes; at age of twelve devised an original method of musical notation; became a singer in the Opera Comique, but lost his voice, and applied himself to teaching oratorical, musical, and dramatic expression; elaborated the system of dramatic expression called by his name, by which the voice and body are trained by fixed rules.

Del'ta, name originally applied to the triangular alluvial plain in the mouth of the Nile, from its resemblance to the Greek letter Δ (delta); now applied to any deposit of land waste laid down by a river or stream at its mouth in a sea or lake. Near their mouths rivers of gentle slope give out distributary streams, diverging on either side, and thus spreading their silt over a deltoid area. On the delta of the Mississippi, such distributaries are called bayous. The greater deltas of the world are those of the Mississippi, Mackenzie, Nile, Po, Ganges, Brahmaputra, Hwang-ho, and Lena.

Deluc (dė-lük'), **Jean André,** 1727–1817; Swiss geologist and natural philosopher; b. Geneva; removed to England, 1773, and was reader to the queen for forty-four years; Prof. at Göttingen, 1798, but later returned to England; published "Letters, Physical and Moral, on the History of the Earth and Man," etc.

Del'uge, inundation or overflow of land by water, a term especially applied to the flood in the time of Noah (Gen. vi–viii). Traditions of the flood occur in many countries. Among the more important is the Chaldean account preserved in a fragment of Berosus, and somewhat resembling that given in the

Bible. Missionaries, both Protestant and Roman Catholic, assert that the Chinese have a story remarkably like that contained in the Bible. The Mahâbhârata of the Hindus contains another tradition of such an event. The ancient Mexicans and many tribes of American Indians have similar accounts. The same is true of the ancient Phœnicians, Greeks, and many other nations, ancient and modern. Egyptian monuments appear to have no account of a general flood. It is now generally held by Christian scholars that the flood recorded in the Bible was local, and not universal.

Delu'sion. See INSANITY.

Delyan'nis, Thĕodor, 1826–1905; Greek statesman; b. Kalavryta; Minister for Foreign Affairs, 1863; associated with the so-called "Ecumenical" Ministry, 1877; represented Greece at the Berlin Congress, 1878; Premier, 1885–86, 1890–92, 1895–97, and 1904–5; assassinated in Athens; his policy while premier is said to have caused the blockade of Greek ports by the powers, and brought on the disastrous war with Turkey, 1897.

Dema'des, d. 318 B.C.; Athenian orator and demagogue, a violent opponent of Demosthenes; was witty, eloquent, and profligate, and acquired great political influence; fought against Philip of Macedon at Chæronea, 338 B.C., but afterwards took a bribe from him, and favored the interest of Philip and his son Alexander; put to death by order of Antipater (or Cassander).

Demand' and Supply', in political economy, the factors whose interaction leads to exchange. The term "effectual demand" was introduced by Adam Smith to denote the demand of those who are able to give for a commodity the price which is asked for it in the market. This is the only demand to be considered economically, as distinguished from mere yearning and longing for things beyond practical reach. Competition is the great equalizer of demand and supply. If a demand arises, capital is invested in the production of the desired commodity till competition pares down the abnormal profit. Demand may be for necessaries or for luxuries. If the supply of necessaries, as wheat and, in a less degree, cotton and wool, falls below the normal demand, the prices of these commodities rise in the direct ratio of the imperative need for an immediate supply. The price of grain will, therefore, rise higher than the price of textiles. If the supply of a luxury is checked, the demand is lessened, for abstinence is possible. The interaction of demand and supply touch all the main headings of political economy, and by some writers the topic is treated merely as a phase of production, distribution, value, etc.

Demarca'tion, line or boundary by which one object is separated or marked off from another; the "dead line" between two armies; also the name given to an imaginary N. and S. line drawn by Pope Alexander VI, 360 m. W. of the Azores, all newly discovered lands to the E. being granted by him to Portugal and all W. to Spain, 1494.

Demavend', highest mountain of Persia, 45 m. NE. of Teheran; culmination of the Elburz chain, which separates the low shores of the Caspian Sea from the high table-land of Persia; height, 18,600 ft.

Dem'bea, Tza'na, or **Ta'na,** lake of Abyssinia; 40 m. long; average width, 25 m.; occupies part of a fertile plain, and is 6,108 ft. above sea level. The Blue Nile issues from this lake.

Deme (dēm), or **De'mos,** one of the smaller divisions of the ancient Attic tribes. The demes (about 173 in number) were local divisions, in which the citizens had to enroll their names for political and other purposes. These dêmes were named sometimes after places, sometimes after persons, and those of the same tribe were not always adjacent, but might be in quite different parts of Attica. Each had its own presiding officer, treasurer, and other officers, and its own assembly, in which the business of the deme was transacted.

Demen'tia. See INSANITY.

Demera'ra, river of British Guiana, rising in the Maccarí Mountains and flowing N. to the Caribbean Sea; length, 350 m. The lower portion is navigable for 75 m. for large vessels, and above that small vessels ascend to the Kaicoutshi rapids. The Demerara has given its name to the most populous Co. of Guiana, and the term is applied loosely to the whole colony, and in particular to the capital, Georgetown.

Deme'ter. See CERES.

Deme'trius, d. 1606; Czar of Russia, usually called the FALSE DEMETRIUS; pretended to be a son of Ivan IV, who at his death, 1584, left two sons, Feodor and Demetrius. The latter died, probably, 1591. The False Demetrius raised an army of Poles, 1603, invaded Russia, and defeated Boris in battle; began to reign in Moscow, 1605, but his partiality to the Poles offended the Russians, who revolted and killed him. He was succeeded by Basil III, or Shuisky. DEMETRIUS THE FALSE, d. 1610; another pretender to the throne of Russia; began to urge his claim, 1607; affirmed that he was the real Demetrius, son of Ivan IV, and was supported by many partisans; killed by a Tartar chief.

Demetrius Phale'reus, abt. 345–284 B.C.; b. Phalerum, Attica; was Governor of Athens, 317–7; his administration was so prosperous and popular that the Athenians erected to him 360 statues. He escaped to Egypt when Athens was taken by Demetrius Poliorcetes, 306; author of many historical and philosophical works.

Demetrius Poliorce'tes, abt. 338–286 B.C.; King of Macedon; son of Antigonus, King of Asia; surnamed Poliorcetes, "besieger of cities," on account of his success as a general; fought for his father against Ptolemy of Egypt in Syria; in 306 B.C. captured Athens from Cassander, and defeated Ptolemy in a naval battle near Cyprus; besieged Rhodes, but failed to take that city; after the death of Antigonus,

and his own defeat at the battle of Ipsus in Phrygia (301 B.C.), lost his possessions in Greece, but subsequently, in alliance with Seleucus, regained them in part; usurped the throne of Macedon, 294, but was driven out by Pyrrhus and Lysimachus, and finally was forced to surrender to his former ally, Seleucus, by whom he was held a prisoner till his death.

Demetrius So'ter, abt. 185–50 B.C.; King of Syria; son of Seleucus Philopator; was a hostage at Rome when his father died, 175 B.C., and his uncle, Antiochus Epiphanes, obtained the throne; having escaped from Rome, was proclaimed king by the Syrians; waged war against the Maccabees. Syria was invaded by Alexander Balas, by whose army Demetrius was defeated and killed.

Dem'idov, Anatoli Nikolaievitch (Prince), 1812–70; Russian philanthropist; b. Moscow; son of Nikolai N. Demidoff; married the daughter of Jerome Bonaparte; lived alternately in France and Italy; spent large sums in the causes of charity and science; founded an agricultural college for the cultivation of the vine in the Crimea.

Demidov, Nikita, b. abt. 1665; Russian manufacturer; son of a serf; established the first iron foundry in Siberia, and was ennobled by Peter the Great, 1720; founded a family distinguished for great wealth and for devotion to works of practical benevolence.

Demidov, Nikolai Nikititch (Count), 1773–1828; Russian capitalist; b. St. Petersburg; fought against the Turks, 1789; raised and fitted out a regiment when Napoleon invaded Russia; became a count and privy councilor; added rich gold and silver mines to the family estate.

Dem'igods (literally, "half gods"), fabulous heroes of Greek and Roman mythology; sometimes deified heroes, and sometimes the offspring of a divinity and a mortal.

De Mille, James, 1837–80; Canadian author; b. St. John, N. B.; Prof. of Classics at Acadia College, 1860–65, and of History and Rhetoric at Dalhousie College, 1865–80; works include "The Dodge Club," "Cord and Creese," "The American Baron," "The Living Link," "Treatise on Rhetoric."

Dem'ilune, fortification; outwork constructed to cover the curtain and the shoulders of the bastions; composed of two faces and two flanks, the former being inclined at a salient angle toward the outside.

Dem'iurge, word used by Plato, and especially by the Neoplatonists and the Gnostics, to designate the Creator of the world, who was conceived by the Gnostics to be inferior to the Supreme Deity.

Demochares (dē-mŏk'ă-rēs), d. after 280 B.C.; Athenian orator; nephew of Demosthenes; a leader of the anti-Macedonian party; banished about 295 B.C., but returned, 287 or 286, and rendered important service as minister of finance.

Democ'racy, government by the people; a state in which the people at large possess the whole sovereignty. There are but three distinguishable modes of government—the monarchical, the aristocratic, and the democratic; the rule of one, of a number, or of the whole. The epithets "despotic," "hereditary," and "elective" describe varieties of the first; an oligarchy is a particular kind of the second; and such terms as "republic" and "commonwealth" import little that is distinctive as to political structure. Of sovereignty in other forms there has been ample experience, but governments based exclusively on the democratic principle, without any admixture of other elements, have not been known until a recent period on any considerable scale. See ARISTOCRACY; MONARCHY; OLIGARCHY.

Democratic Par'ty, in the U. S., a party at first known as Republican, but soon as Democratic-Republican; founded abt. 1792, under the lead of Thomas Jefferson, by those who believed that it was not wise to form a centralized republic, who secured the ten amendments to the Constitution, and who construed the Constitution to carry only delegated powers. The acts of the Federal Party under the lead of John Adams, the passage of the Alien and Sedition laws, the known opposition of its leaders to the acquisition of W. territory, gave to Jefferson and his followers great advantages, and with the acquisition of the Louisiana territory, really the first great act of sovereignty performed by the republic, the Federal Party was practically removed from opposition.

The question of protection and protective tariffs was not made a party issue until long after this period, and did not become a divisive one until after the War of 1812. During the debates on these financial questions (1815–28) there were no party organizations in the present sense of those words. As the election of Mr. Monroe was practically unanimous, men of various opinions claimed to belong to the same organization. During this period began those divisions which resulted in the reformation of party lines under Jackson and Henry Clay.

From the beginning of the Revolution the tendency of those who afterwards became Democrats was toward free trade. Free commerce with all nations was considered necessary for the growth of the country. In the Republican platform adopted at Philadelphia by the Congressional caucus in 1800 the sixth plank was "Free commerce with all nations, political connection with none, and little or no diplomatic establishment." This was not considered incompatible with a system of taxes on imports by which revenue was raised, because the government had to be maintained by taxation; but it was looked upon as the object to be finally attained, and it grew out of the principles held to be fundamental.

In 1828 the defeat of J. Q. Adams by Jackson led to a division in the party, and the National Republican Party was formed, which favored the expenditure by the government of large sums for internal improvements; opposed the spoils system in the public service, and favored the increasing of the power of the

government. In 1832 they advocated a protective tariff, and in 1835 became known as Whigs. The first formal Democratic platform was adopted 1840. Under Van Buren, Tyler, Polk, Pierce, and Buchanan, the party held power almost uninterruptedly until 1861. The defeat of Gen. Scott as a presidential candidate (1852) practically put the Whig Party out of the active list of political combatants.

Meanwhile, the Democratic Party had carried through a successful war with Mexico, had annexed Texas, acquired the territory extending to the Pacific, abolished the U. S. Bank, and passed (1846) the Walker Tariff Bill, subordinating the principle of protection to that of revenue. In 1860 the party divided over the slavery issue, Stephen A. Douglas becoming the regular nominee, and John C. Breckenridge, that of the slave-holding interest, or seceding delegates, thus making the election of Lincoln certain. The party did not return to power until 1884, when Cleveland was elected. In 1892 he was again elected on a platform opposing a high protective tariff. The nomination of W. J. Bryan, 1896, and the adoption of a free-silver coinage plank in the platform again caused the defeat of the party, and they were unsuccessful also in the campaigns of 1900, 1904, and 1908. Those Democrats who supported McKinley in the campaign of 1896 were popularly known as "Gold Democrats."

Democ'ritus, abt. 460–361 B.C.; Greek philosopher; b. Abdera, Thrace; called the "laughing philosopher" in contrast to the "weeping philosopher" Heraclitus, from his habit of laughing at the foibles of mankind; wrote many works on physical, moral, mathematical, musical, and other subjects, parts of which remain; founded the ancient atomistic philosophy, believing that the soul or thought is produced by the motion of round fiery atoms.

Demod'ocus, celebrated bard of the Phæacians; representing in the "Odyssey" as singing, at the banquet of Alcinous, when he entertained Ulysses, the battles and the fate of the Greeks who went to Troy, with the conquest and destruction of that city, and also the loves of Mars and Venus. Later writers represent him as an old and blind musician and poet of Corcyra, who composed a poem on the destruction of Troy, and another on the loves of Mars and Venus.

De Mogeot (dė mō-zhō'), **Jacques Claude,** 1808–94; French author; b. Paris; lectured at Beauvais, Bordeaux, and Lyons, and on rhetoric at the Lycée St. Louis at Paris after 1843; author of "Letters and Men of Letters of the XIXth Century," "History of French Literature," etc.

Demogor'gon, dreadful and mysterious being alluded to by some of the later classical writers, and by Boccaccio, Ariosto, Spenser, Milton, Shelley, and others. In Shelley's "Prometheus Unbound" he is the conqueror of Jupiter. The ancients dreaded the very mention of his name.

De'mon, term of Greek origin, used by classical writers primarily for the Supreme Divinity, sometimes as a synonym for *theos* (meaning a god), and later more especially as a tutelary or guardian divinity which was supposed to attend on men. Neoplatonists divided the demons into good and bad. The dread of evil demons became so great that in time the word came to be almost always used in a bad sense. In the Greek New Testament evil spirits are often called demons (commonly translated devils), and Beelzebub is spoken of as the prince of demons.

Demo'nax, Cynic philosopher who lived and taught at Athens in the second century. Though a native of Cyprus, he passed most of his life in Athens, where he was greatly honored; was buried by the public with great magnificence.

Demonetiza'tion, removal of the legal-tender quality from money; in a more general sense, the destruction of its character as money. See COINAGE; CURRENCY.

Demonol'ogy, branch of religion which relates to demons. Belief in supernatural beings affecting human beings seems to be universal and from earliest times. Among savage nations evil demons play a prominent part. To them is attributed diseases and other misfortunes and calamities. Among those a little higher in the scale of civilization the demon is still a dreaded being who can control a man to his loss and compass his death. So also in China, India, Japan, and among the Mohammedans sometimes, the demon plays comparatively harmless pranks, but usually he means mischief. The allegation of witchcraft among the Puritans of New England proves how persistent the belief in demons is, for the alleged witches lived in the midst of a Christian civilization in many respects remarkable for its purity.

It is not denied that the ancient Jews believed in demons. The law of Moses commanded to kill those who had familiar spirits (Lev. xx, 27), and it is said that Saul "put away those who had familiar spirits and the wizards out of the land" (I Sam. xxviii, 8). His recourse to a witch proves his own belief in their existence. Belief in demons passed over into the Christian Church. They loved to tempt holy men and women. St. Anthony is a classic illustration. It was held as a dogma that every child born into the world was under the power of an evil spirit, and so the early Church used a regular formula of exorcism before the baptismal formula, and the like is still done by the present Roman and Greek churches. The heathen world was by the early Fathers, and by the far later Christian missionaries, considered to be full of demons, to whose opposition the slow progress of gospel truth was attributed. Idolatry has frequently been represented as the worship of demons. See WITCHCRAFT.

Demonstra'tion, in philosophy, that process by which a result is shown to be a necessary consequence of the premises from which it is asserted to follow. The word is also applied to an imperfect proof, yet of a nature such that no reasonable doubt is possible, as Kepler's proof that Mars moved in an ellipse.

Dem'ophon, in Grecian mythology, a King of Athens; son of Theseus and Phædra, who is said to have accompanied the Greeks on their expedition against Troy, whence he rescued his grandmother Æthra. When Diomed, on his return from Troy with his Argives, began to plunder Attica Demophon attacked him and carried off the Palladium, or statue of Pallas. Demophon is said also to have assisted the Heraclidæ against Eurystheus, who was slain in the battle that took place, and to have received Orestes when, after his mother's murder, he sought refuge at Athens.

De'mos. See DEME.

Demosthenes (dē-mŏs'thĕn-ēz), **abt. 383–22** B.C.; most illustrious of Greek orators; b. Athens; son of the proprietor of a cutlery establishment and a chair factory; was trained in law and rhetoric by Isæus; by taking lessons of actors and by self-effort he overcame great natural disabilities; followed the profession of a speech writer; and soon became a distinguished advocate. In 351 he began his long struggle with Philip of Macedon with the first of three noted orations, the "Philippics," followed it with the three "Olynthiacs" (349–48), supporting the cause of the Olynthians whom Philip had attacked; with Philocrates and Æschines negotiated and ratified a treaty with Philip, 346; denounced Æschines as treacherous in the famous speech, "On the Embassy," 344; became preëminently the leader of the people as opposed to the Macedonian party headed by Æschines; delivered the second and third Philippics, 344, 341; and caused the expulsion of the tyrants whom Philip had established in Eubœa.

Philip having violated the treaty, open war was declared, 340, and ended in the defeat of Chæronea, 338. Demosthenes took part in the battle; was chosen to deliver the funeral oration over the fallen Greeks, and to superintend the fortification of Athens; was counsel, 330, for Ctesiphon whom Æschines prosecuted for an attempt to have a golden crown presented to Demosthenes as an acknowledgment of his patriotic service; delivered on that occasion his great speech "On the Crown," which outranks all speeches known to fame. He was drawn into the disgraceful affair of Harpalus, and banished, 324, on the charge of accepting bribes; returned, 323, headed the unsuccessful revolt against the Macedonians, was condemned to death, but escaped to the island of Calaurea, whither he was followed by the emissaries of Antipater, and to escape them took poison. Sixty orations which bear his name are extant.

Demosthenes, d. 413 B.C.; Athenian general prominent in the Peloponnesian War. He and Eurymedon jointly commanded an army sent, 413 B.C., to reënforce Nicias at Syracuse. After the Athenians had been defeated he surrendered, and was put to death by the victors.

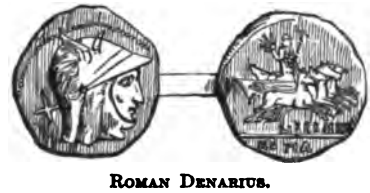
Demot'ica (ancient *Didymotichos*), town of European Turkey; Adrianople province; on the Maritza; 25 m. S. of Adrianople; has manufactures of silk and woolens and pottery. Here Charles XII of Sweden lived in retirement after his defeat at Pultowa (1709). Pop. abt. 8,000.

Demot'ic or Encho'rial Writing, cursive or shorthand alphabet used in ancient Egypt; was an abbreviation of hieratic writing, which was itself an abridged form of the true hieroglyphics; its remains are difficult to decipher. It came into use in the seventh century B.C., and was still used 200 A.D. It contained forty-two letters and forty-eight syllabic characters; appears on the Rosetta Stone; and was extensively employed even in public documents. Remnants of this alphabet appear in the Coptic.

Demur'rer, in law, a suspension of action in a cause until the determination of some point by the court. In a pleading in equity, as well as at law, it raises a question as to the sufficiency in law of the case as stated by the opposite party. There may also be a demurrer to evidence, on the ground that the testimony offered by a party in a cause is insufficient to maintain or overthrow the issue.

De Murska (dē mŏrsh'kă), **Ilma,** 1844–89; Hungarian opera singer; b. Budapest; taught singing in Paris and Vienna, and made her début in opera in Florence when nineteen years old; appeared in London, 1865, and in New York, 1874, with great success. Her voice broke and she soon sank into obscurity and poverty.

Dena'rius, Roman silver coin; originally equal to ten asses; first coined 269 B.C. Its weight



ROMAN DENARIUS.

varied at different periods, its later value being equivalent to sixteen asses, or about sixteen cents of U. S. money.

Den'derah (ancient *Tentyra*), town of Upper Egypt, near the left bank of the Nile; opposite Keneh. Here are the ruins of a celebrated temple, dedicated to Athor, the Egyptian Venus.

Den'drite, peculiar mineral, containing internally, or having its surface covered with, filamentary forms resembling moss, ferns, trees, etc. Moss agate and Mocha stone are examules.

Dendro'bium, genus of epiphytic orchids, mostly natives of the tropical parts of Asia and Australia. They have flowers of great beauty, sometimes also remarkable for grotesqueness of form or for fragrance.

Den'drolites, petrifactions, rock formations in vegetable forms, found in secondary and coal formations; consist of plants and fragments of trees, having, generally, nothing in

common with those now growing in the same regions. They are mostly cycads, tree ferns, conifers, etc.

D'Enghien (dăng-găń'). See ENGHIEN.

Dengue (dĕn'gā), epidemic, seldom fatal, disease, which has prevailed at different times in the S. parts of the U. S. and in the E. and W. Indies; is called "dandy fever" or "dengue," a Spanish perversion of "dandy," from the stiff carriage of those affected; is also called "break-bone fever." The symptoms are headache, fever, pain and swelling of the smaller joints, an eruption of the skin, and gouty pains which often cause lameness for a considerable time. The disease is infectious, and has many characters which suggest a relation to influenza.

Denis (dē-nē'), **Saint**, Latin DIONYSIUS; patron saint of France and first Bishop of Paris; according to Gregory of Tours, was one of seven missionaries sent from Rome abt. 250 A.D. to preach to the Gauls, and after he had converted great multitudes suffered martyrdom probably in 272 under Valerian. His festival is October 9th.

Den'izen, in Great Britain, an alien who had received from the sovereign letters patent to make him a British subject. He might take lands by purchase and devise, but could not take by inheritance. Since 1870, however, aliens can take and inherit lands the same as natural born subjects. A denizen cannot be a member of the Privy Council or of either House of Parliament, and cannot hold any office of trust, civil or military.

Den'mark, kingdom of N. Europe, consisting of the peninsula of Jutland and several adjacent islands of the Baltic Sea—Seeland, Fünen, Falster, Laaland, Samsöe, Bornholm, Langeland, and Möen, together with the Faroe islands; area, 15,592 sq. m.; pop. (1906) 2,605,268. Besides Denmark proper the Danish monarchy possesses Greenland, Iceland, and the W. Indian islands of Santa Cruz, St. Thomas, and St. John. Jutland is bounded on the N. by the Skager-Rack, on the E. by the Cattegat, and on the W. by the North Sea; surface low and level, the highest elevation, Himmelbjerget (the Mountain of Heaven), being only 565 ft. Denmark has no considerable river. Seeland is separated from Sweden by the Sound, and from the island of Fünen by a channel called the Great Belt. Climate humid, and modified by the proximity of the sea; mean annual temperature 46° F.; soil generally productive, either alluvial or sandy; staple productions, barley, oats, wheat, rye, buckwheat, potatoes, beans, pease, and flax.

Chief exports, cereals, butter, bacon, horses, cattle, hides, and fish. There are iron foundries, sugar refineries, beet-sugar factories, oleomargarine factories, paper mills, distilleries, and manufactories of furniture, porcelain, gloves, articles of horn, bone, and ivory, etc. Commerce carried on mainly with Germany, Great Britain, U. S., Sweden, Norway, and Russia. Strength of the army about 824 officers and 8,945 men; aggregate war strength, 67,448; navy very small and kept for coast defense. Established religion, Lutheran, but other sects are tolerated; education generally diffused; higher educational institutions include the Univ. of Copenhagen, a veterinary and agricultural college, College of Pharmacy, Royal Academy of Arts, Polytechnic Institution, twelve agricultural schools, and thirty-one Latin schools. Danish, the language of Norway and the N. part of Schleswig, as well as of Denmark proper, is a Gothic language. Government, a hereditary constitutional monarchy; the executive power belongs to the king, and the legislative power is vested in the king and diet (*Rigsdag*) jointly. The *Rigsdag* is composed of two houses, called the *Landsthing* and the *Folkething*. The latter, which is the lower house, consists of 114 members, elected by universal suffrage for a term of three years. In 1908 a government franchise bill was adopted which gave women taxpayers the right to vote in communal elections.

The Danes, a piratical and maritime people, conquered Normandy, 912; invaded England in the ninth century, and completed the conquest abt. 1016. Margaret, Queen of Denmark and Norway, conquered Sweden, 1388, and united the three Scandinavian kingdoms. At her death, 1412, each kingdom chose its separate ruler. Christian I, Count of Oldenburg, founder of the present reigning family, ascended the throne 1448. The monarchy was elective until 1660. Sweden was separated from Denmark, 1528, and the latter was forced to cede Norway to Sweden, 1814. In 1848 a rebellion broke out in the duchies of Schleswig and Holstein, the inhabitants of which are mostly German. The non-German Powers and Sweden and Austria recognized the indivisibility of Denmark, 1850. A constitution securing the entire civil liberty and universal suffrage was granted, 1849. In 1858 the king abolished the joint constitution of the Danish state for Holstein and Lauenburg, and restored absolute monarchy in these countries. A war with Austria and Prussia, 1864, ended in the loss of Lauenburg and Schleswig-Holstein.

Dennery (dĕ-nē-rē'), **Adolphe Philippe**, 1811–99; French dramatist; b. Paris; produced alone and in collaboration about 200 dramas, vaudevilles, and comic operas; best known, "The Pearl of Savoy," "The Two Orphans," "Aladdin, or the Wonderful Lamp," "Tribute of Zamora."

Den'newitz, village of Prussia; province of Brandenburg; 42 m. SSW. of Berlin; here, September 6, 1813, an army of 50,000 Prussians, under Bülow, defeated an army of 70,000 French, Saxons, and Poles, commanded by Ney; French loss about 15,000 killed, wounded, and prisoners.

Den'sity, in physics, the quantity of matter which a body contains per unit of volume. Density thus defined is called "absolute density." The quantity of matter in any body is called its *mass*, and is measured by the weight of the body, to which it is always proportional. The density of bodies is therefore directly as their mass and inversely as their volume. It

is customary to express density in terms of that of some substance selected as a standard. In the case of solids and liquids, water at 4° C. is the usual standard. Gases are compared with air or with hydrogen. This is "relative density," a term which is synonymous with specific gravity. See SPECIFIC GRAVITY.

Denta'tus, Manius Curius, d. 265 B.C.; Roman plebeian consul noted for his martial exploits, frugality, and integrity; said to have been born with teeth, hence the surname; defeated the Samnites, 290 B.C.; gained a decisive victory over Pyrrhus near Beneventum, 275; consul for the third time, 274, and censor, 272 B.C.; during censorship constructed an aqueduct from the Anio to Rome.

Den'tils, square blocks or projections in the bed moldings of the cornices of the Corinthian, Ionic, and composite orders; term also applied to ornaments in cornices of rooms founded on the same style of decoration.

Den'tine. See TEETH.

Den'tistry, branch of surgery treating of the teeth. When teeth begin to decay it is necessary to check the process and repair the injury by filling. All decayed matter is removed first, the cavity is shaped and then swathed with an antiseptic; after careful drying it is ready to be filled. The filling materials are numerous. Gold is the best metal on account of its resistance to both the force of mastication and the action of the fluids of the mouth. Tin foil, worked in a similar manner, requires less time, is almost as durable, and costs much less. Amalgam, an alloy of silver and tin, is easily mixed into a pasty mass by the addition of mercury and is quickly introduced, but molecular changes during solidification render it an unreliable stopping, and discoloration makes it unsightly. Gutta-percha, bleached and mixed with a little pulverized feldspar or zinc oxide, is introduced with hot instruments and makes a durable, nonconductive filling of good color. The operation of preparing the cavity has been freed from disagreeable features to a great extent by the method of desiccating with warm air, the use of anodynes, and the employment of rapidly revolving and keen-edged burrs. Porcelain filling is a piece of porcelain shaped to fit the cavity and cemented into place with thinly mixed zinc phosphate.

In former times exposure of the dental pulp was deemed cause for extraction. It was found later that it could be devitalized with arsenious acid, and its place filled with an inert substance, greatly prolonging the usefulness of the tooth. The still more conservative method now prevails of covering the exposed part with some nonirritant substance and filling over this. The extraction of teeth is rendered painless by the inhalation of nitrous oxide, which is less dangerous than chloroform or ether. A hypodermic injection in the soft tissue surrounding the tooth of chloride of cocaine in a four to ten per cent solution will practically deaden the sensation of pain without rendering the patient unconscious. When teeth have grown in irregularly, crowding or overlapping, they can be forced into position and held there by artificial means until new bony material forms about the roots, which requires some six months, but this operation must be performed while the bony process is still pliable, not later than the twentieth year of age. Artificial sets or dentures, which replace the natural teeth when all have been lost, are imitation teeth of porcelain made with a platinum peg to fasten them to a base. This the dentist makes from a plaster cast of the jaw and palate. These bases or plates are made of gold or vulcanized rubber and sometimes of celluloid, which is a much less durable material. Porcelain crowns with metal dowels are cemented into the roots of teeth. In bridge work two such crowns are joined by a row of artificial crowns. See TEETH.

Denti'tion. See TEETH.

Denuda'tion, the removal of solid matter by water in motion, whether of rivers or of the waves and currents of the sea, and the consequent laying bare of some inferior rock. This operation has exerted an influence on the structure of the earth's crust, as universal and important as sedimentary deposition itself; for denudation is the necessary antecedent of the production of all new strata of mechanical origin. The formation of every new deposit by the transport of sediment and pebbles necessarily implies that there has been somewhere else a grinding down of rock into rounded fragments, sand, or mud equal in quantity to the new strata. "The larger part of the valleys of the world," says Dana, "are formed entirely by running water."

Den'ver, James W., 1817–92; American politician; b. Winchester, Va.; moved to Ohio, 1830; studied law; moved to Missouri; raised a company and served in the Mexican War; to California, 1850, where he became prominent in politics and was elected Secretary of State and to the Thirty-fourth Congress; appointed Commissioner of Indian Affairs and then Governor of Kansas Territory; returned to California, 1859; served in the Union army in the early part of the Civil War; suggested the name Colorado for the territory formed out of Kansas. The capital of Colorado was named after him.

Denver, capital of Colorado and of Arapahoe Co.; on the S. Platte River; 15 m. E. of the base of the Rocky Mountains; 5,200 ft. above the sea level; commands a magnificent view of mountain scenery, including Pike's, Long's, and other noted peaks perpetually covered with snow; popularly known as the "Queen City of the Plains." The city contains a U. S. Govt. building, branch of the U. S. mint, State Capitol (383 by 313 ft.), county courthouse, city hall, union depot, Cathedral of St. John (Protestant Episcopal), Procathedral of the Immaculate Conception (Roman Catholic), Denver Univ., College of the Sacred Heart, Wolfe Hall, Jarvis Hall, St. Anthony's and St. Joseph's hospitals, and a dozen public parks. Denver is an important center for mining, agriculture, and stock raising, the leading industries of the state, and has the largest smelting works in

the world. In 1905 it had 722 factories, with aggregate capital of $27,433,879, and products valued at $36,660,410; property valuation of over $115,300,000; and total debt of about $3,000,000. Six national banks, in 1906, had resources exceeding $55,000,000, and clearing-house exchanges were nearly $340,000,000 during the year. Denver was settled 1857, named after James W. Denver, chartered 1859, when the legislature first met there. Is connected with the East by the union of the Denver Pacific and the Union Pacific railroads at Cheyenne, Wyo., 1868. Pop. (1906) 151,920.

De'odand, in early English law, any personal chattel, animal, or thing which had caused the death of a human being, and for that reason was applied to pious uses, or, as the term implies, given to God. It was, in fact, forfeited to the king, and distributed in alms by his almoner.

Deoxida'tion, chemical process by which oxygen is abstracted from a compound; term when applied to metals is synonymous with reduction. A compound of a metal with oxygen may in many cases be reduced or deoxidized by heating it with carbon or in a stream of hydrogen gas.

Depart'ment, in governmental operations, a branch or division of the supreme authority. The U. S. Constitution provided for three departments, the legislative (the Congress), judicial (the courts), and executive (the President). The latter is assisted in his work by a body of men composing what is popularly called the Cabinet (*q.v.*). The word "department" is also applied to a main division of France and a few other countries, and is synonymous with canton (Switzerland), nomarchy (Greece), compartimento (Italy), government (Russia), vilayet (Turkey), amter (Norway), lau (Sweden), state (Mexico), and province in several other countries.

Department Store, modern establishment for the sale at retail of a great variety of personal and domestic commodities; usually of very large proportions, and divided into departments, each one of which is a distinct store in itself. The equipment of a department store is so comprehensive that in it one may furnish his house completely, clothe his entire family, supply his table, and satisfy an exacting taste with books, pictures, various works of art, and an endless variety of minor luxuries and attractions—all to be obtained under one roof.

De Pauw Univer'sity, institution of learning situated in Greencastle, Putnam Co., Ind.; founded by the Indiana Conference of the Methodist Episcopal Church and chartered in 1837. The first class graduated in 1840. Until 1884 the institution consisted of a college and a preparatory school, and was called the Indiana Asbury University. Hon. W. C. De Pauw, of New Albany, a prominent philanthropist, provided by his will for an endowment of about $1,000,000, besides giving during his lifetime large sums for the better equipment of the university. In recognition of these munificent gifts the corporation in 1884 changed the name of the institution to De Pauw University. At the time of this change the institution became a university in fact. Professional schools of theology and law and special schools of music, art, and pedagogics were established, and graduate courses were added in the college of liberal arts.

De Peys'ter, surname of several celebrated New Yorkers. JOHANNES DE PEYSTER, abt. 1600–85, was a merchant; b. Haarlem, Holland, of French Huguenot extraction; emigrated to New Amsterdam (New York); became schepen, 1656; alderman, 1666; burgomaster, 1673, and deputy mayor, 1677, refusing the mayoralty because he could not speak English; displayed his patriotism and firmness in one of the most trying crises of the Dutch colony, 1673. His eldest son, ABRAHAM DE PEYSTER, 1658–1728, was a jurist; b. New York; deputy mayor of New York, 1677; acting Governor and President of the Council, 1700; Chief Justice, 1700–1; colonel commanding the militia of the city and county of New York, and treasurer for many years of the colonies of New York and New Jersey. JOHN WATTS DE PEYSTER, 1821–1907; American author; b. New York City; was a descendant of Johannes De Peyster; joined the state militia; became adjutant general, 1855; breveted major general, 1866; published many military and historical works, including "Life of Field-Marshal Torstenson," 1855; "The Dutch at the North Pole," 1857, and "Personal and Military History of Gen. Philip Kearny," 1869.

Dept'ford, town of England; on the Thames, 4 m. below London Bridge, partly in Kent and partly in Surrey. The famous dockyard in which Peter the Great worked as a shipbuilder was closed, 1869. The victualing yard, from which the navy is supplied with provisions, is the largest of the kind in the kingdom. There are large marine engineering works and an extensive electric-light plant. Pop. (1901) 110,513.

De Quin'cey, Thomas, 1785–1859; English author; b. Manchester; entered the Univ. of Oxford, 1803, and in 1804 contracted a habit of using opium, which he took at first for pains in the head. In 1808 he left the university, became a friend and associate of Coleridge, Southey, and Wordsworth, and began to reside at Grasmere, in the lake district. When in the prime of life he overcame the opium habit, and 1821 published "Confessions of an English Opium Eater." He was one of the most brilliant magazine writers of his time, and wrote on a great variety of subjects, but his works are mostly fragmentary.

Derayeh, El (ĕl dĕ-rī'ĕh), town of Arabia, in Nedjed; 430 m. NE. of Mecca; formerly the capital of the Wahabees; has a beautiful situation, with gardens and fertile fields in the environs; once a populous town, and contained about thirty mosques, but was taken and partly destroyed by Ibrâhim Pasha, 1818.

Derbend', or **Derbent',** fortified maritime town of Russia; capital of Daghestan; on the W.

shore of the Caspian, at the foot of a mountain, and at the entrance of a defile called by the ancients *Albaniæ Pylæ*, and now the Pass of Derbend. To the S. lies the seaward extremity of the great Derbend or Caucasian wall, known to the Turks as Alexander's wall, which originally had a height of 29 ft. and a thickness of 10, with iron gates and watch-towers, forming a valuable defense of the former boundaries. In ancient times Derbend was an important town. The Arabs established a khanate here, 728, and it was from time to time the dwelling place of Haroun-al-Rashid, but in the course of centuries it changed masters many times. Peter the Great captured it from the Persians, who later regained it, but the siege of 1795 gave it again to Russia, with which it was incorporated by the treaty of 1813. Pop. (1897) 18,000.

Derby (dăr'bĭ), **Edward Geoffrey Smith-Stanley** (fourteenth Earl of), 1799–1869; English statesman; b. Lancashire; Chief Secretary for Ireland, 1830; supported the Reform bill; carried a coercion bill through the House in spite of the opposition of O'Connell; and brought in the first national education act for Ireland. In 1833 he entered the Whig ministry as Secretary for the Colonies, and used his influence and eloquence to effect the emancipation of the slaves; resigned, 1834, because of the government's position on the question of the Irish Church, and abandoned the Whig Party. He was again Secretary for the Colonies in the Cabinet of Sir Robert Peel, 1841–45; created Baron Stanley, 1844, he passed into the House of Lords; resigned office, 1845, because opposed to the repeal of the corn laws, and soon after this date began to be regarded as the leader of the Conservatives and Protectionist Party. On the death of his father, 1851, he succeeded him as Earl of Derby. He was Prime Minister, 1852; leader of the opposition during the administration of Palmerston; and Premier, 1858–59. This ministry is noted for the passage of the bill removing the disabilities from the Jews and of that transferring the control of India from the E. India Company to the crown. He produced a translation of Homer's "Iliad" into blank verse (1867), which is highly commended.

Derby, Frederick Arthur Stanley (sixteenth Earl of), 1841–1908; English statesman; b. London; represented Preston in the House of Commons, 1862–65; Secretary of State for War, 1878; Secretary of State for the Colonies, and later President of the Board of Trade in Lord Salisbury's government; Governor General of Canada, 1888–93.

Derby, George Horatio, 1823–61; American military engineer; b. Dedham, Mass.; graduated at West Point, 1846; captain of topographical engineers, 1860; served in the war with Mexico, 1846–47; engaged at Vera Cruz and Cerro Gordo (severely wounded); on various surveys and explorations, 1846–52; on improvement of San Diego harbor, Cal., 1853–54; on staff of commanding general and in charge of military roads, Department of the Pacific, 1854–56; on coast survey, 1856; and lighthouse engineer, 1857–59; under the pen name of "John Phœnix" was author of "Phœnixiana," 1855; "Squibob Papers," 1859.

Derby, manufacturing town of England; capital of Derbyshire; on the Derwent; 119 m. NNW. of London and 35 m. NNE. of Birmingham. It is an old town, and during the Heptarchy was called *Northwothing*. Its present name was given to it by the Danes. It was incorporated by Henry I. Its charter was granted to it in 1683 by Charles II. The private houses are built mostly of brick. Here is a free grammar school founded in 1162. Derby has manufactures of silk, cotton, lace, hosiery, porcelain of great beauty, jewelry, and ornaments of fluorspar; also foundries, rolling mills, and tanneries. The chief industry is throwing silk. Pop. (1907) est. 125,774.

Derce'to, Greek name of a Syrian goddess, supposed to be the Dagon of the Philistines.

Dercyl'lidas, Spartan commander sent to aid the Asiatic Greeks in their resistance to the Persian forces under Pharnabazus and Tissaphernes, 399 B.C.; captured many cities in Asia Minor; built a wall to protect the Greeks of the Chersonesus against the Thracians; superseded by Agesilaus, 396 B.C.

Derg, Lough (lŏk dĕrg), Red Lake; expansion of the Shannon River, in Ireland; between Tipperary, Galway, and Clare; 24 m. in length and averaging 2 m. in width. Also a small lake of Ireland between Donegal and Tyrone, which incloses an isle, the reputed entrance to St. Patrick's purgatory, visited by many devotees, and long the most celebrated place of pilgrimage in Ireland.

Dermatol'ogy. See SKIN.

Der'ne, Der'na, or **Bel'ed-al-Soor** (ancient *Darnis*), seaport of N. Africa; in Barca; 1 m. from the Mediterranean. During the hostilities between the U. S. and Tripoli, 1805, this town was taken by the forces under Gen. Eaton.

Déroulède (dā-rō-lād'), **Paul**, 1846– ; French poet and politician; b. Paris; attracted much attention by his "Chants du soldat," 1872, and "Nouveaux chants du soldat," 1875, on account of their intense anti-German spirit; chief of the Patriotic League, an organization that appealed directly to the patriotic devotion of all citizens. In 1884, when Boulanger became Minister of War, Déroulède, his stanch supporter, sought to further a vigorous foreign policy and excite anti-German feeling. The power of the league showed itself in the election of January 27, 1889, which gave him an enormous majority as deputy. The government then suppressed the league. He wrote a patriotic drama, "The Hetman," and a semi-religious drama, "The Moabites."

Derpt. See DORPAT.

Der'rick, crane or apparatus for lifting and transporting to short distances heavy weights, such as stone in a quarry, though in permanent locations it is superseded by the traveling crane. It usually consists of a tall mast supported on a pin on which it may revolve,

held steady by ropes or rods, and provided with a boom which may be raised or lowered by rope or wire tackle, the blocks of which are fastened at the top of the mast and the outer end of the boom. A tackle also depends from the outer end of the boom, by which the load is carried. The tackle ropes are operated by wheel gearing near the bottom of the mast. See CRANE.

Der'vish, Persian word equivalent to the Arabic *fakir*, signifying poor, and designating a Mohammedan religious class corresponding in some respects to the monks of Christendom. There are many orders. They are gathered usually into communities, and live in monasteries. Their discipline requires poverty, chastity, and humility. Their religious rites consist of mortifications of the flesh, prayers, and dancing. The most numerous sect are the Mevlevis, or whirling dervishes, whose ceremonies consist chiefly of dances performed to music, and growing more animated and swift until the dancers are exhausted and sit down. The Rufais, or howling dervishes, sway backward and forward until they foam at the mouth and fall to the ground. The dress of the sect called Calenders is sometimes parti-colored, and sometimes only a sheepskin about the loins, while the upper part of the body is painted fantastically. The *marabouts* among the Mohammedans of the Barbary States are similar to the dervishes.

Desayx de Veygoux (dā-sā' dē vā-gō'), **Louis Charles Antoine,** 1768–1800; French general; b. Auvergne; served in several campaigns of the Army of the Rhine, and gained promotion to general; in 1798 took part in the expedition to Egypt; won a victory at Sidiman, and completed the conquest of Upper Egypt, 1799; afterwards governed that province with such moderation and justice that the natives called him "The Just Sultan." In May, 1800, he returned to France, and joined the army in Italy. The French were about to retreat at Marengo, when Desayx arrived with a reserve, and converted defeat into a decisive victory, but was killed in the action.

Descartes (dā-kärt'), **René,** 1596–1650; French philosopher and mathematician; b. La Haye; educated at the College of La Flèche, where he acquired great proficiency in mathematics and astronomy, and formed an intimate friendship with Mersenne; left college, 1612, dissatisfied with the method and doctrines which were then in vogue; resolved to efface from his mind all scholastic dogmas and the prejudices of his education, to reject the authority of books, and to admit only that which was confirmed by reason and experiment. In pursuit of knowledge he traveled in Italy, France, and other countries; settled in Holland, 1629, to devote himself to mathematics, astronomy, metaphysics, etc.; made important discoveries in algebra and geometry, which he announced in his "Discourse on the Method of Reasoning Well and of Investigating Scientific Truth," 1637. This work comprises treatises on metaphysics, dioptrics, and geometry. He was the first who introduced exponents or applied the notation of indices to algebraic powers, and gave a new and ingenious solution of equations of the fourth degree.

He published, 1641, "Meditationes de Prima Philosophia," which gave a wonderful impulse to philosophical inquiry. He founded the superstructure of all positive knowledge on the basis of self-consciousness, or the relation between consciousness and existence, which he expressed in the phrase, *Cogito, ergo sum*—"I think, therefore I exist." He worked a greater change in metaphysical thought that any modern philosopher. The innovations and paradoxes of the Cartesian philosophy excited much hostility among the theologians and the disciples of Aristotle. His book was condemned by the college of cardinals at Rome. Among his other works is "Principles of Philosophy," 1644, in which he propounds his theory of the world—that the sun is the center of a vortex of an ethereal fluid, whose whirling motion produces the revolution of the planets and other phenomena.

Descent', in law, the succession to landed estate after the owner's death, in cases where he has not made disposition of the estate. The rule of descent among the ancient Greeks was that the sons shared alike, and the daughters were dependent upon the bounty of their brothers. Among the Hebrews the eldest son had a double portion. With the ancient Romans sons and daughters shared alike. The former English law was very complicated, but has of late received important modifications. The law of primogeniture prevails as to males, while several females of equal degree claim as one heir.

The subject of descent is regulated by positive rules in the U. S., and but few of general application can be stated.

I. The persons to whom land descends may be grouped as follows: (1) Lineal descendants. These, if of equal degree, take equally undivided shares. If of unequal degree, those who are more remote take the share that would have belonged to their parent if living. Thus if the ancestor had left a son A, and C, D, E, children of a deceased son B, the grandchildren taken together would have the share of B. Those who inherit on equal terms are said to take *per capita*; those who take the shares of deceased persons, as above illustrated, are said to take *per stirpes*. (2) Where there are no descendants, the next claimants would regularly be the parents, as they are removed but one degree from the intestate, while the nearest collateral relatives (brothers and sisters) are two degrees. Still, if the estate descended to the intestate from maternal relatives, there are cogent reasons for preferring the brothers and sisters to the father, and the same reasons for preferring them to the mother where the land came from paternal relatives. Under these circumstances the law of some of the states gives the land to the father or mother for life only, as the case may be, and the estate itself to the brothers and sisters. (3) If there be no father or mother or descendants, the land will descend to the brothers and sisters equally, with the same distinctions as to taking *per capita* and *per stirpes* as noticed under subdivision (1). (4) The next claimants are either grandparents, or, if these be passed over,

as may be the case, uncles and aunts and their descendants. (5) Distinctions sometimes are recognized between relatives of the whole blood and those of the half blood, so that the latter are excluded from inheriting.

2. Illegitimate relatives cannot in general inherit, though in a number of the states they may under certain qualifications, particularly from the mother and maternal relatives.

3. The law of the state where the land is situate governs descent, without reference to the law prevailing where the owner resides.

4. In general, all interests in and rights to land are governed by the rules of descent. Thus should the intestate have only a right of action, or be the owner of a future estate, or have simply a beneficial ownership, such as an estate held in trust, his rights and qualified estates of this nature will be transmitted under the same general rules as if he were legal owner in possession.

5. In a number of the states aliens cannot inherit. This is a rule of the English common law. In other states it has been abrogated. See HEIR.

Deschamps (dā-shŏn'), **Eustache,** 1328–abt. 1410; called MOREL during his life; French poet; b. Champagne; has an important place among the artificial versifiers of the end of the fourteenth century; chiefly produced *ballades, rondeaux, virelais,* and similar verse; still we have by him a poem of 13,000 lines, entitled "Miroir de mariage," and an "Art of Poetry," which has much interest.

Deschanel (dā-shā-nĕl'), **Émile Auguste Étienne Martin,** 1819–1904; French author; b. Paris; published, 1850, "Catholicisme et Socialisme," and articles for the republican press which caused his banishment; returning, 1859, became an editor of the *Journal des Débats*; 1881, Prof. of Modern French Literature in the Collège de France, and a life Senator; wrote "Histoire de la Conversation," 1858; "Physiologie des Écrivains et des Artistes," 1864; "Études sur Aristophane," 1867; "Le Romantisme des Classiques," 1882, etc.

Des'ert, barren land area, determined by aridity, cold, or the absence of soil. Deserts may possess great variety of form. The barren rocks and snows of mountain summits, the icy plateau of Greenland, the fresh lava flows of volcanic districts, and the salt beds of extinct lakes may all be included with arid lands under the general term desert. The dryness by which deserts are produced depends on three things: 1. Mountains inclosing the region from moist winds. Thus the deserts of the W. basins of Nevada, Utah, and Arizona are sheltered by the Sierra Nevada from the vapor-bearing winds of the Pacific. 2. The occurrence chiefly or exclusively of warming winds; that is, of winds which flow toward the equator, warming as they advance and yielding no rain. Thus the great Sahara lies chiefly under the NE. trade winds. 3. Distance from the ocean, even though not inclosed by mountains. The deserts and steppes of the Aralo-Caspian region may be reached by Atlantic winds crossing the lowlands of central Europe, but the overland distance is so great that most of the vapors brought from the sea fall as rain on the way. The form of arid deserts varies from unbroken plains, as the beds of extinct lakes or seas in Utah, Nevada, and Australia, to sandy and stony plateaus much diversified by high and low land, as over the greater part of the Sahara.

Deser'tion. See ABANDONMENT.

Desh'nef, Simeon, Russian explorer of the seventeenth century, whose existence and work were almost wholly forgotten until 1898, when his circumstantial report of his discoveries, preserved in the archives at Yakutsk, Siberia, was brought to light. In June, 1898, the czar commanded that the name E. Cape, by which the point of Asia nearest to N. America had long been known, be renamed Cape Deshnef, in honor of the explorer who first sailed through Bering Strait and determined the E. limit of Asia. It was not known in the middle of the seventeenth century that N. America was not united by land with Asia, and Deshnef settled this weighty question. In 1648 Deshnef launched a small trading vessel on the Kolyma River, floated down to the Arctic Ocean, and turned E. Six other boats started with him, but his craft was the only one to pass through Bering Strait and reach Kamtchatka. He did not see the N. American mainland, but proved that Asia was separated from it. About eighty years later, Capt. Bering, ignorant of the work Deshnef had done, affirmed the separation of Asia from America, and the strait that divides them bears his name, while the pioneer explorer was not recognized in the geographic nomenclature of the region till 1898.

Desima (dĕh-sē'mă), very small artificial island in the Bay of Nagasaki, Japan, shaped like a fan. In the early history of European relations with Japan the Dutch were the only people admitted, and they were confined to this island and subjected to many indignities.

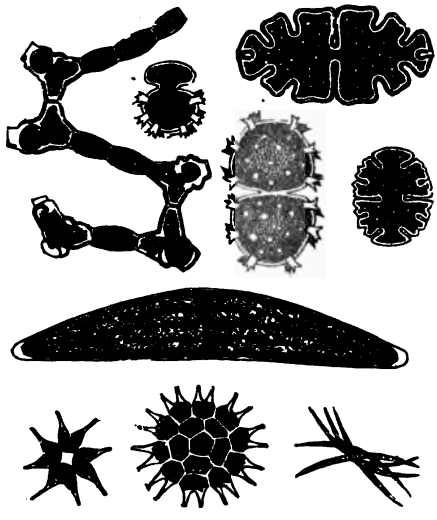
Des'man, common name for the two species of musk shrews; members of genus *Talpidæ,* a family of insectivorous mammals embracing the moles and desmans. The Russian desman is about 8 in. long, exclusive of the tail, which is as much more. The fur is soft, brown, and glossy, the hind feet long and webbed, the tail naked and vertically flattened. But for its long, slender nose, it bears a strong external likeness to a small muskrat. It inhabits the lakes and rivers of SE. Russia, and feeds on aquatic insects. The Pyrenean desman, so named from its habitat, is smaller, and has a round tail.

Desmarres (dā-măr'), **Louis Auguste,** 1810–82; French oculist; b. Evreux; greatly promoted the knowledge of the pathology and anatomy of the eye, invented an ophthalmoscope now generally used, and published "Theoretical and Practical Treatise on Diseases of the Eyes," a standard authority.

De Smet, Peter John, 1801–72; American missionary; b. Termonde, Belgium; came to the U. S., 1821; donned the Jesuit garb and proceeded to the Far West, and established

missions and schools among the Indian tribes in Oregon, Utah, Vancouver, Missouri, and neighboring territories.

Desmid'ieæ, minute algæ, or protophytes, which grow in fresh water. For a long time claimed both as animals and plants, they stand on the limits of either kingdom. The desmidieæ resist decomposition, exhale oxygen on exposure to the sun, preserve the purity of the water containing them, and when burned do not emit the peculiar odor characteristic of animal combustion. As vegetable productions, they are peculiar for their beauty, variety of forms, and external markings and appendages. They are mostly of an herbaceous green color, and contain a green internal matter.



COMMON TYPES OF DESMIDIEÆ.

Des Moines (dĕ moin'), capital of Iowa and of Polk Co.; at the junction of Des Moines and Raccoon rivers; 174 m. W. of Davenport; is intersected by both rivers; business section near the rivers; residential portion on higher ground beyond; has U. S. Govt. building (cost $350,000), new state capitol (cost $3,000,000), state arsenal containing relics and Iowa flags of the Civil War, public library (cost over $400,000), Drake Univ. (Christ.), Des Moines College (Baptist), Highland Park Normal College, and county courthouse. The U. S. census, 1905, reported 291 factories, having $9,593,926 capital, and annual output valued at $15,084,958; industries include woolen and flour mills, packing house, linseed-oil mills, and manufactures of paint, soap, boilers, engines, plows, scales, wagons, carriages, paving brick, building brick, hollow brick, sewer pipe, drain tile, cigars, furniture, woven-wire fence, gloves, hats, harness, hosiery, iron and brass, medicines, pottery, typewriters, etc. The site of Des Moines was a part of the Sac and Fox Indian reservation, and was ceded by the U. S. Govt. to the state, 1846. The town was incorporated, 1853, and in the following year it became the state capital in place of Iowa City. Pop. (1905) 75,626.

Des Moines, river of the U. S.; the largest that traverses Iowa; rises in the SW. of Minnesota; flows in a SSE. direction to Des Moines, below which it runs nearly SE., until it enters the Mississippi at the SE. extremity of Iowa, 4 m. below Keokuk; length about 500 m.

Desmoulins (dā-mo͞o-lăn'), **Benoit Camille**, 1760–94; French revolutionist; b. Guise; published revolutionary pamphlets, 1788–89, and after Necker's dismissal summoned the people to arms, protesting with a loaded pistol in each hand that he would not be taken alive. The muskets and cannon at the Invalides fell into their hands, July 13, 1789. He participated in the capture of the Bastile on the 14th, and became the popular hero, styling himself "the attorney-general of the lamp-post" in his pamphlet, "La Lanterne aux Parisiens." He also started an influential newspaper, *Les Revolutions de France et de Brabant*. After the establishment of the Cordeliers Club he became the bosom friend of Danton. He promoted the insurrection of August 10, 1792, became Danton's secretary in the Ministry of Justice, and was elected with him to the Convention. He saved several persons during the September massacres, and would have saved the lives of the Girondists if he could, though he had ridiculed them in his "Histoire des Brissotins," and rejoiced over their fall. His conciliatory measures, proposed in "Le Vieux Cordelier" (January, 1794), caused him to be arrested with Danton (March 30th), and sentenced to death without trial. His beautiful wife, who vainly implored Robespierre and instigated a riot to save him, was guillotined a few days later.

De Soto (dā sō'tō), **Fernando**, abt. 1500–42; Spanish explorer; b. Badajoz. After studying at one of the universities, he accompanied, 1519, his patron, Pedrarias Davila, on his second expedition to America as Governor of Darien. He supported Hernandez in Nicaragua, 1527, and, 1528, explored the coast of Guatemala and Yucatan. In 1532 De Soto joined Pizarro in his enterprise for conquering Peru; penetrated through the mountains, 1533, and discovered the great national road which led to the Peruvian capital, and was soon after selected by Pizarro to visit the Inca Atahuallpa as ambassador; prominent in the engagements which completed the conquest of Peru, and hero of the battle which resulted in the capture of Cuzco, the metropolis. He soon after returned to Spain with a large fortune. Having obtained permission to make the conquest of Florida at his own expense, De Soto sailed, 1538, with over 600 men, and reached Florida, 1539; sent back his ships to Havana, set out on a journey to the NW., and reached the Mississippi, 1541, after losing many of his followers. He crossed the river, went N. to Pacaha, and thence to the White River, the W. limit of his expedition. Then proceeding S. he wintered at Autiamque, on the Washita River. While descending the Mississippi, 1542, he died, and to conceal his death from the hostile savages his

body was sunk at midnight in the middle of the stream. His followers, reduced in number more than half, then went to Mexico.

Dessalines (dā-sä-lēn'), **Jean Jacques**, abt. 1760–1806; Emperor of Haiti; b. Guinea, W. Africa; was taken to Haiti as a slave, and adopted his master's name; fought against the planters, 1792, and after the emancipation, 1793, aided Toussaint l'Ouverture in expelling the English. During the insurrection against Napoleon's restoration of slavery he desperately defended St. Marc, burning the town before surrendering; became chief commander in the new conflict after Toussaint's abduction during the truce (May, 1802). After the proclamation of independence (January 1, 1804) he was made governor general for life. He exterminated the whites, and on October 8th had himself crowned emperor as Jean Jacques I. He projected a constitution and schemes for negro immigration, but soon relapsed into his characteristic and monstrous ferocity, and was killed by conspirators.

Dessau (dĕs'sow), capital of Duchy of Anhalt; on the Mulde near its entrance into the Elbe; 80 m. SW. of Berlin; is well built, and contains a fine ducal palace, town hall, theater, college, normal school, and manufactures of woolen cloth, hosiery, hats, tobacco, etc. It was at the bridge of Dessau that Wallenstein won his victory over Count Mansfeld in the Thirty Years' War, April 25, 1626. Pop. (1900) 50,846.

De Staël-Hol'stein. See STAËL-HOLSTEIN.

Detaille (dė-tāy'), **Jean Baptiste Édouard**, 1848– ; French military painter; b. Paris; name usually coupled with that of de Neuville, the two being counted the foremost military painters of the modern French school; works include "French Cuirassiers bringing in Bavarian Prisoners" (Corcoran Gallery, Washington); "Distribution of the Standards"; "Charge of the First Hussars."

Deter'minism, in philosophy, the doctrine that denies the freedom of the will, and refers all acts of seeming volition to a law of necessity. According to Sir W. Hamilton's use of the term, it signifies the theory of the necessitarian school of philosophers, who hold that the acts of the will are determined by an inner necessity arising from the controlling force of motives acting on character. These motives in man are the result of his peculiar and necessary development in accordance with the laws of the universe, of which he is a part. This doctrine is a part of pantheistic systems of philosophy, but belongs as well to other systems, and holds a prominent place in the philosophy of Leibnitz, according to which each monad, substance, or being acts independently of all others, but by a preëstablished harmony governing its internal development is prevented from conflicting with the rest of the universe.

Det'mold, William, 1808–94; German-American surgeon; b. Hanover; surgeon in the Hanoverian army; resident of New York City, 1837; professor in College of Physicians and Surgeons; introduced orthopedic surgery into the U. S.; during the Civil War was a volunteer surgeon in Virginia; invented a knife and fork for one-handed men, known as "Detmold's knife."

Detmold, town of Germany; capital of the principality of Lippe-Detmold; on the Werre; 42 m. SW. of Hanover; has a fine castellated palace, museum, theater, public library, celebrated teachers' seminary, and manufactures of linen and woolen goods, tobacco, cards, and carved work in wood and stone. Near this town is the battle field where Hermann destroyed the Roman army of Varus in 9 A.D. Pop. (1900) 11,971.

De Tocqueville (dė tŏk-vĕl'), **Alexis Charles Henri Clerel**, 1805–59; French author; b. Paris; with Gustave de Beaumont examined the penitentiary system of the U. S., 1831; alone investigated the political and social institutions of the country; and wrote "De la democratie aux États-Unis," 1835, which received the Montyon prize, and procured his admission to the Academy, 1844; elected, 1839, to the Chamber of Deputies, and, 1848, to the Constituent Assembly; Minister of Foreign Affairs, June 2, 1849. He supported the expedition to Rome, but, differing with Louis Napoleon in other respects, resigned in October. In 1856 he published "L'ancien régime et la révolution."

Detouche (dė-tōsh'), **Laurent Didier**, 1815–82; French painter; b. Rheims; educated for the legal profession, but after 1837 devoted himself to art. Among his historical paintings are "Saint Paul ermite," which he gave to the Cathedral of Rheims; "Le Supplice de Jeanne d'Arc," which procured him the gold medal; and "La Disgrâce de Fouquet"; also did excellent work as a painter of genre.

Detroit', capital of Wayne Co., Mich.; first city of the state in population and importance; on Detroit River; 18 m. from Lake Erie and 7 m. from Lake St. Clair; the center of six important railroad lines. The river, here the boundary between the U. S. and Canada, is about half a mile wide opposite the city, and, having great depth, forms an excellent harbor. The city is laid out on two plans; one, that of a circle with avenues radiating from the Grand Circus as a center; the other that of streets crossing each other at right angles. About halfway between the Grand Circus and the river is the Campus Martius, facing which is the city hall (cost $600,000), with a soldiers' and sailors' monument by Randolph Rogers at its front. Among the many parks are Belle Isle, on Lake St. Clair; Palmer, Cadillac, Capital Square, Grand Circus, and Waterworks. Fort Wayne, with its extensive works, stands just below the city, commanding it and the river.

There are many foundries, blast furnaces, copper-smelting works, locomotive and car works, shipyards, dry docks, iron-bridge works, safe manufactures, furniture and other woodworking establishments, pork-packing houses, and some of the most extensive stove, automobile, pharmaceutical, tobacco and cigar, salt and soda-ash factories in America.

The site of Detroit was first visited by the

French, 1610, and remained under their dominion until 1762. The first legitimate settlement was made, 1701, when a fort was erected called Ponchartrain, the first governor being the Sieur de la Motte Cadillac; and from time to time emigrants were sent over by the French Govt. In 1763 the British assumed possession, erecting fifteen years later a fort. In 1787 its government was assumed by the U. S., Gen. Arthur St. Clair being the first governor. In 1812 it was surrendered to the British, and was retaken, 1813. In 1824 it was incorporated as a city. The history of Detroit is intimately connected with the history of the whole NW. Three different sovereigns have claimed its allegiance; it has twice been besieged by Indians, once captured in war, and once totally consumed by fire. Pop. (1904), 317,591.

Detroit Riv'er, outlet of Lake St. Clair; flows nearly S., forming part of the boundary between Michigan and Canada, and enters Lake Erie; length, 24 m.; greatest width, 1 m.; navigable for the largest vessels.

Dettingen (dĕt'tĭng-ĕn), Bavarian village; on the Main; noted for an important battle in the war of the Austrian succession, in which the "Pragmatic" army, upholding the claims of Maria Theresa and consisting of the Austrians, Hanoverians, and English, under George II, defeated a larger French force under Marshal Noailles, June 27, 1743. The French armies fell back into Alsace, and Charles VII made peace with Maria Theresa. This was the last time an English king took the personal command of an army in battle.

Deuca'lion, in Greek mythology, a son of Prometheus and the husband of Pyrrha; also the father of Amphictyon and Hellen. He saved himself and his wife from a deluge by building a ship or ark, which, after the waters had subsided, rested on Mount Parnassus. Deucalion and his wife then went to consult the oracle of Themis, and were directed to repair the loss of mankind by throwing behind them the bones of their mother. This expression meant only the stones of the earth. The stones thrown by Deucalion became men, and those thrown by Pyrrha women.

Deus ex machina (dē'ŭs ex măk'ĭ-nă), supernatural deliverer; expression borrowed from the classic stage with reference to the practice of the Greek dramatic poets, in having recourse to the intervention of a god, who descended by stage machinery, and brought about a speedy dénouement of the plot.

Deuteron'omy, last book of the Pentateuch, consisting in part of a restatement of the law, as given in Exodus, Leviticus, and Numbers, and containing also, besides special commands and admonitions, an account of the death of Moses. Its authorship has been traditionally assigned to Moses, excepting the part relating to his death; but Gesenius, Ewald, and other critics consider it the production of a very late period.

Deutsch (doich), **Solomon**, 1816–97; Prussian philologist; b. Gleiwitz; accepted a call to a synagogue in Philadelphia in 1857, later was rabbi in Syracuse, Baltimore, and Hartford; after 1885 devoted his entire time to literary and philological work; published "Medical German," "Key to the Pentateuch," "Biblical History in Biblical Language," etc.

Deutz. See COLOGNE.

Dev, or **Dew**, Persian word, akin to the Sanskrit *devá*, god, but deriving its meaning of evil spirit from the use of the word *daeva* in the Zend Avesta.

Deva (dā'vă), Sanskrit word signifying god, and forming a part of many names in Hindu mythology, as Mahadeva (the great god), a name of Siva.

Devalo'ka, literally, the sphere or abode of a deva or god. The Buddhist system recognizes six devalokas or celestial spheres, situated in tiers above Mount Meru, and between the Brahmalokas and the earth.

Devapraya'ga, town of N. Hindustan, in Gurwhal; at the confluence of the Alakanonda and Bhagirathi, which unite to form the Ganges. As the origin of that sacred river, it is considered a holy place by the Hindus, and is visited by multitudes of pilgrims.

Devel'opment. See DARWINISM; EVOLUTION.

Dev'enter, city of the Netherlands, in province of Overyssel; on the Yssel; 60 m. E. by S. from Amsterdam; surrounded by ramparts, and has a good harbor; contains a cathedral, large townhouse, courthouse, and several hospitals; has foundries and manufactures of carpets, hosiery, etc., and exports butter. Pop. (1906) 27,811.

De Vere (dĕ vēr'). See VERE.

Devereux (dĕv'ĕ-rō). See ESSEX, EARL OF.

Devia'tion of Plumb Line, phenomenon especially observed near mountains, in which case the attraction of the mountain draws the line out of the perpendicular. Maskelyne used this fact in his experiments to determine the density of the earth. The same phenomenon has been observed on plains, and is probably caused either by great caves under ground, or by large masses of matter near the surface greatly surpassing in density the average of the earth near the point of observation.

De Vigny (dĕ vēn-yē'), **Alfred Victor** (Comte), 1799–1863; French author; b. Locheo, Touraine; served in the army, 1815–28; became one of the most prominent representatives of the romantic school; works include "Poems, Ancient and Modern"; "Cinq-Mars," historical novel; "Stella, or the Blue Devils," a narrative; "Chatterton," a tragedy; admitted to the Academy, 1845.

Dev'il, name among Christians of any evil spirit, but especially of the chief of evil spirits, nearly corresponding in the latter sense to the Hebrew Satan and the Mohammedan Iblis or Shytan. The Greek for devil appears to be derived from the character of Satan as presented in the book of Job—a fault-finder or slanderer. In the Middle Ages, and even later, the devil was supposed to possess in perfection

every kind of skill and knowledge, transcendent skill in all the magic arts. When a man of genius had accomplished some wonderful feat which seemed clearly above the unassisted powers of the human mind, it was commonly supposed that he had been either assisted by the devil or that the latter had performed for him the entire work; in which case, of course, some promise (such as the final surrender of the soul of the assisted party) or reward had to be given for his services. This idea, once almost universal in Europe, furnished the basis of the legend of Dr. Faustus. In the miracle plays of the Middle Ages the devil is the comic character, yet the players and the audience lived in daily fear of him. The doctrine of a personal devil was one of Luther's firmest possessions, and in private and public he had much to say about his agency. For the consideration of theological connections, see SATAN. See also APOLLYON; BEELZEBUB.



DEVILFISH (CEPHALOPTERA VAMPYRUS).

Dev'ilfish, popular name for one of the cuttlefishes, usually the octopus. In the U. S. applied in the South to a large ray or skate,



DEVILFISH (OCTOPUS VULGARIS).

and on the Pacific coast to the California gray whale.

Dev'il's Ad'vocate. See ADVOCATUS DIABOLI.

Devil's Bridge, famous bridge in Switzerland, over the Reuss, built of stone from mountain to mountain, 75 ft. in length, on the road over St. Gothard, from Germany to Italy.

Devil's Is'land, small island, 7 m. from the E. coast of S. America and 27 m. NW. of Cayenne, French Guiana. Near the island are two others, St. Joseph and Ile Royal, and the group was first known as Iles du Diable. The unfortunate immigrants who had settled on the neighboring mainland fled to the islands from the pestilential coast, 1764, and renamed them Iles du Salut (Salvation Islands), which name is still applied to the group. One of France's penal settlements has occupied St. Joseph and Ile Royal since 1854. Capt. Alfred Dreyfus (*q.v.*) was imprisoned on Devil's Island.

Devil's Wall, name given during the Middle Ages to the remains of Roman fortifications designed to protect the settlements on the Rhine and Danube against the inroads of the German tribes. Portions of the wall still exist between Abensberg and Cologne.

Devil Wor'shipers, or Yez'idees, religious sect living in Armenia, Kurdistan, and Asiatic Turkey; number more than 200,000. Their faith is a curious mixture of degenerate Christianity, as derived from the Gnostics, with Mohammedanism. Their chief peculiarity is that they treat the devil with great respect, because they believe he will be restored to heaven, where they wish him to be their friend. They hold the Old Testament in great reverence, and pay much less regard to the New Testament and the Koran. They practice both infant baptism and circumcision, and have four orders of priesthood.

Devo'nian Pe'riod, division of geologic time following the Silurian period and preceding the Carboniferous; so called from Devon, England. The most abundant vestiges of its life are invertebrate, and trilobites are among the dominant forms, but fishes were then greatly developed as to variety and size. The earliest traces of trees belong to this period. In the U. S., Devonian rocks are greatly developed in New York and Pennsylvania, where they have been classed under the terms Oriskany (oldest), Corniferous, Hamilton, Chemung, and Catskill. From this district, which may be regarded as the typical American area, a long and diminishing belt extends SW. to Alabama, the formations appearing in various ridges of the Appalachian system. In Maine the rocks have been recognized in a metamorphic condition, *i.e.*, the stratified deposits were made harder and more crystalline by earth heat and pressure.

In the lower peninsula of Michigan these formations surround the coal basin. In Ohio, Indiana, and Kentucky they surround the Silurian area of the Cincinnati uplift, and they are also developed in E. Iowa. Farther W. their occurrence is sporadic, and they are usually of little thickness, but in Nevada they are well developed. In New York and Ohio they include limestones and sandstones, which afford excellent building material. Among the upper members are great carbonaceous shales, which yield by natural distillation much of the petroleum and natural gas stored in the sandstones of Pennsylvania and E. Ohio, and some of these sandstones also belong to the Devonian series. One of the British formations of the period is a fresh-water deposit called the Old Red Sandstone.

Dev'onshire, Duke of, Spencer-Compton Cavendish, Marquis of Hartington. See HARTINGTON, MARQUIS OF.

Dev'onport (before 1824 called PLYMOUTH DOCK), fortified town of Devon, England; on E. shore of the estuary of the Tamar (called the Hamoaze); 2 m. WNW. of Plymouth; defended by huge fortresses, built at cost of $22,500,000; is the most complete and thoroughly equipped naval arsenal in the world, and has dockyards sufficient for the largest fleets; also has docks and extensive wharves for its maritime trade; manufactures of sails, ropes, anchors, soap, etc.; contains a military hospital and large barracks; pop. (1905) est. 76,864.

Dew, moisture deposited during the night on bodies exposed in the open air; produced by the condensation of watery vapor from the atmosphere, unaccompanied, however, by any visible mist. Such mist appears when the condensation takes place within the body of the air itself, and is then called "fog" in the lower regions of the atmosphere, and "cloud" in the higher. Dew occurs only at the surface of contact with solids, the air above remaining clear. The deposit of dew is caused by the cooling of the bodies bedewed, and this takes place in consequence of the radiation of heat into open space without any equivalent return. The temperature to which the atmosphere must be cooled in order that condensation may begin is called the *dew-point*.

Clouds check the formation of dew by obstructing radiation. When the sky is wholly overcast no dew is formed. Neither is any dew formed beneath an open shed or shelter, though the earth around may be so wet as to leave the form of the roof marked on the ground. Facts of this kind were supposed to prove that the dew descends like rain—a belief still preserved in the expression "the falling of the dew." Wind prevents dew, by continually changing the strata of air in contact with the colder solids. The nights most favorable to dew are those in which the sky is clear and the air motionless.

Very absurd notions prevailed among the ancients in regard to the dew. By some it was supposed to descend from the stars, and to be possessed of wonderful virtues. The Roman ladies used it as a cosmetic, supposing it unsurpassed for the improvement of the complexion. See HUMIDITY.

Dewar', Sir James, 1842– ; Scottish chemist; b. Kincardine-on-Forth; Jacksonian Prof. of Natural Philosophy in the Univ. of Cambridge and Fullerian Prof. of Chemistry in the Royal Institution of Great Britain; coinventor with Sir Frederick Abel of cordite, a smokeless powder; his most noteworthy work has been in connection with researches into the behavior of gases under great pressures at temperatures approaching the absolute zero. In 1886 he liquefied oxygen and solidified nitrogen and air; 1897, liquefied fluorine, an element so elusive that its characteristics had never been accurately observed; 1901, liquefied and solidified hydrogen. Besides reports on liquefied gases, he has published "The Oxidation Products of Picoline," "Specific Heat of Carbon at High Temperatures," "The Physiological Action of Light," "Spectroscopic Investigations," and many other papers.

De Wet', Christian, abt. 1860– ; Boer military officer; b. Dewetsdorp, Orange Free State (now Orange River Colony); was a farmer and member of the Volksraad; though he had had no previous military training, fought with distinction in the British-Boer War, 1899–1900, attaining the rank of general in the Boer army; after the fall of Pretoria he, for many months, evaded capture and with a small force inflicted heavy losses on the British garrisons and patrols.

De Wette (dĕh vĕt'ĕh), **Wilhelm Martin Leberecht**, 1780–1849; German biblical critic; b. Ulla, near Weimar; Prof. of Theology at Heidelberg, 1807–10; at Berlin, 1810–19; in 1819, dismissed for having written a consolatory letter to the mother of the murderer of Kotzebue; removed to Weimar; called (1822) to Basel, where he remained till his death; works include "Commentary on the Psalms," "Jewish Archæology," "Christian Dogmatics," "Introduction to the Old and New Testaments."

Dew'ey, Chester, 1783–1867; American botanist; b. Sheffield, Mass.; Prof. of Mathematics and Natural Philosophy at Williams College, 1810; principal of the Collegiate Institute at Rochester, N. Y., 1836; Prof. of Chemistry, Univ. of Rochester, 1850–60; wrote many excellent monographs on the Carices of N. America, etc.

Dewey, George, 1837– ; American naval officer; b. Montpelier, Vt.; graduated at the Naval Academy, 1858; served with distinction on the steamer *Mississippi* at the passage of Forts Jackson and St. Philip and the capture of New Orleans, 1862; again on the *Mississippi* when she was lost at Port Hudson, 1863, and on the *Colorado* at Fort Fisher, 1864–65. On August 1, 1889, chief of bureau of equipment with rank of commodore; took command of the Pacific squadron, January 1, 1898, and May 1st destroyed the Spanish fleet in Manila Bay, Philippines, without himself losing a ship or a man; also captured Cavite, and later, in conjunction with Gen. Merritt, took Manila itself; made rear admiral, 1898; admiral, 1899.

Dewey, Orville, 1794–1882; American clergyman; b. Sheffield, Mass.; originally a Calvinist, became a Unitarian, and preached in the pulpit of Dr. Channing in Boston as his assistant; pastor at New Bedford, 1823–33; at New York City, 1835–48; of the New South Church, Boston, 1858–62. He was an original thinker and an impressive pulpit orator; published several volumes of sermons, a volume of European travels, and, as his chief work, "The Problem of Human Destiny."

De Witt', surname of two famous Dutch brothers. CORNELIUS DE WITT, 1623–72, was a naval officer and statesman; b. Dort; had a high command under De Ruyter, 1666, when he burned the English shipping in the Thames; distinguished in the naval battle of Solebay, 1672; in the same year was falsely accused of complicity in a plot to poison the Prince of Orange; was imprisoned, tried, and acquitted, but as he was coming out of prison was murdered, by a mob, with his brother, JAN DE

WITT, 1625–72, who was also a statesman, b. Dort; and leader of the party hostile to the house of Orange; elected grand pensionary of Holland, 1653, and controlled the policy of the state in the interest of the republicans; negotiated, 1654, a treaty of peace with Cromwell, in which a secret article stipulated that no member of the Orange family should ever be a stadtholder; reëlected grand pensionary, 1658–63; conducted with ability the war with England, 1665–67; formed a triple alliance between England, Holland, and Sweden, 1668, frustrating the attempt of Louis XIV to annex the Spanish Netherlands; finally lost popularity, and by failing to repel an invasion by Louis XIV became the object of public fury, and was replaced by William of Orange; was murdered by the populace.

De Witte'. See WITTE.

Dexip'pus, Publius Herennius, Athenian author, rhetorician, and soldier of the third century A.D.; man of great learning; attained the highest honors in his native state. In 262 he was commander of the army against the "Scythians" (probably Goths), who had invaded Attica, and defeated them, though not before they had captured Athens. A public statue was erected to his honor, the base of which, with its inscription, still exists.

Dex'ter, Henry, 1806–76; American sculptor; b. Nelson, N. Y.; blacksmith's apprentice and farm hand in early life; removed to Providence, R. I., and essayed portrait painting; to Boston, 1836, and afterwards to Cambridge, Mass.; began the study of sculpture, 1840, but had no instruction in his art; made more than 200 portrait busts, Longfellow, Agassiz, and Dickens being among his sitters; also the statues, "The Backwoodsman," "Gen. Joseph Warren," and "Nymph of the Ocean."

Dexter, Henry Martyn, 1821–90; American clergyman, editor, and author; b. Plympton, Mass.; pastor of Congregational churches in Manchester, N. H., and Boston, Mass., 1844–67; one of the editors of *The Congregationalist,* 1859–66; editor in chief, 1866–90; was prominent in the councils of his denomination; wrote much on its history and polity, and on New England history generally; works include "Congregationalism," "The Congregationalism of the Last Three Hundred Years," with bibliography of over 7,000 titles; "Common Sense as to Woman Suffrage," "England and Holland of the Pilgrims."

Dex'trin, substance ($C_6H_{10}O_5$) formed by the action of diastase, or of mineral acids, on starch. There are several commercial products known as dextrin, British gum, starch gum, which are mixtures containing perhaps some dextrin. Pure dextrin is a colorless, glassy body, which may be rubbed down to a white powder. It is practically tasteless, and inodorous.

Dey (dā), throughout the seventeenth century, title of the commander of the armies of Algiers. Afterwards the dignity of pasha was united with that of dey, and the dey was the highest officer of Algiers till the French conquest, 1830.

Dezful', or **Dezfil',** town of Persia; province of Khuzistan; on Dezful River, here crossed by a bridge of twenty-two arches; 28 m. WNW. of Shuster; is the chief mart of Khuzistan. Pop. (1900) 15,000.

Dhar (där), town of Malwa, central Hindustan; capital of a protected state of the same name, 32 m. WSW. of Indore; has two large mosques of red stone, and a fort with twenty-six towers. Pop. (1900) 15,000.

Dhawalaghiri (dä-wŏl-ä-gē'rē), lofty peak of the Himalaya Mountains, in Nepaul, N. Hindustan; altitude, 26,826 ft.

Dhole (dōl), species of wild dog, found in the W. Ghauts and other mountainous parts of India; is somewhat smaller than a wolf, and is remarkable for fierceness and courage.

Dhol'ka, town of British India; presidency of Bombay; 22 m. SW. of Ahmadabad; is inclosed by a mud wall, and stands in the midst of ruined palaces, mosques, mausoleums, and spacious tanks lined with masonry. Pop. (1901) 25,000.

Dholpur', town of Rajputana, British India; on the Chambal, 34 m. S. of Agra; capital of a feudatory state. A fair lasting two weeks is held here annually. Pop. abt. 15,000.

Dhya'na, Sanskrit word meaning contemplation or meditation. Its Pali equivalent is *jhana.* It is used in Buddhism to denote (1) a kind of abstract contemplation intended to destroy all attachment to existence in thought or wish, and thus as a means of arriving at Nirvana; and (2) one of four groups of heavens called Brahmalokas, corresponding to the four degrees of stages of this mystic contemplation. Those who attain to the fourth stage are reborn in one of the seven highest heavens in which bodily form still continues.

Di'abase, igneous rock of the trap family, and therefore related to basalt, gabbro, etc. Economically, diabase has little value except for making foundations, walls, or roads. It is abundant in Scandinavia and in other parts of Europe; also in the red sandstone formation (Trias) of the Atlantic border region.

Diabe'tes, disease characterized by the excessive excretion of urine; occurs in two forms. *Diabetes insipidus,* now called *Polyuria,* is distinguished from the other much more dangerous disease by the fact that the urine is very watery, but otherwise not abnormal. *Diabetes mellitus* "sweet" or "honeyed" diabetes (*Glycosuria*), is one of the most incurable and serious of diseases. The urine is light colored, but has its specific gravity greatly increased by the presence of diabetic sugar. The disease is further characterized by excessive appetite, intense thirst, wasting, and prostration of mind and body. Its causes are obscure, and its treatment not well understood.

Diab'olo, game of European invention, which first came into notice abt. 1906; played by one or more persons; instruments, two small sticks joined by a piece of cord, and a spool of wood, celluloid, metal, or leather, consisting of two cones joined at their apexes. The spool having been placed on the ground, the player

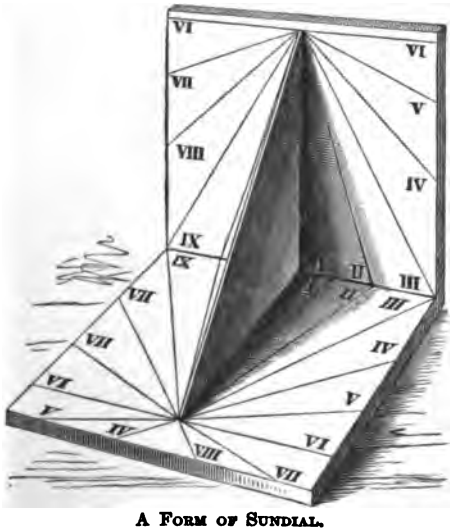
loops the cord under the waist of the spool, which is raised by a quick movement of the hand, and set spinning on the string, the rotation being increased by raising and lowering one stick. The game consists in making the spool rise and fall while spinning and catching it on the cord again, after throwing it in the air by suddenly tightening the cord. In "diabolo tennis" the spool, which has been spinning on the cord, is shot across the net by a sudden tightening of the cord, and the receiver retains it, still spinning, just long enough to obtain control of it and gather direction for his return throw.

Diagno'sis, discovery of the nature and seat of disease, one of the most difficult and important branches of medicine and surgery; is based on "physical signs and rational symptoms"; "signs" being appreciable by the senses, and "symptoms" arrived at by the educated judgment. Both, however, are popularly known as symptoms. The stethoscope, thermometer, laryngoscope, etc., furnish important aid in this branch of medical practice.

Diagom'eter, electric instrument for determining the conducting power of fixed oils; consists of a dry voltaic pile, by means of which a current is passed through the oil, and the strength of the current determined by a magnetized needle; is used especially for the detection of the adulteration of olive oil.

Diag'oras, Greek poet and philosopher; b. in the island of Melos; lived abt. 425 B.C.; said to have been a disciple of Democritus of Abdera; was a citizen or resident of Athens. As he rejected the popular religion and polytheism, he was stigmatized as an atheist, and fled from Athens, 411 B.C., or, as some say, was banished for impiety; lived at Pallene for a time, and then removed to Corinth.

Di'al, instrument showing the hour of day by the shadow of a gnomon or style cast by



A Form of Sundial.

the sun on a graduated arc; also called sundial. The invention is of great antiquity, the Greeks having, it is said, learned its use from the Chaldeans. In the construction of a dial the object is to find the sun's distance from the meridian by means of the shadow. When this is known, the hour also is known, provided we suppose the sun's apparent motion to be uniform, and that it moves in a circle parallel to the equator during the whole day. In point of fact, neither of these conditions is fulfilled, but the error arising from this is of small amount. See Clock.

Dialec'tic, technical term much used in Greek and German philosophy, but of a somewhat vague signification. In the Greek philosophy logic was the science of the forms of thinking, of conclusion and evidence; it taught the manner by which to arrive at truth. Dialectic treated of the truths arrived at; it was the science of expressing and setting forth ideas, the science of definition. In the German philosophy it is best explained by considering it in its relation to the expression "dogmatical." Dogmatical is applied to a definition when it excludes absolutely the opposite; "dialectical," when it combines the opposites as correlatives. According to the dogmatical definition, everything is either good or bad; and if it is good, it is not bad; if it is bad, it is not good. According to the dialectic definition, anything which is essentially good may have some bad in it, and anything which is essentially bad may have some good in it. Both in the Greek and German philosophy the word *dialectic* is sometimes used to signify a mere word fence. See Logic.

Di'alects, various modes of speech regarded as local and differing forms of a standard language, or as closely related descendants from a common original. In the latter, which is the less frequent meaning, the word is used, for instance, of the four forms of the Greek language—the Attic, Ionic, Doric, and Æolic dialects—and it was in connection with these that it was first used by the Greek grammarians. The popular view, that dialects represent a debased or perverted form of the standard language, is nearly the reverse of the truth. The standard, or literary language, is generally based historically upon one of a number of sister dialects, but is often of artificial structure, including compromises and mixtures with various dialects. The dialects represent language according to the natural laws of its development. Hence arises the importance of the dialects for study of the life of language, and as natural growths they furnish the only reliable bases for determining the development and the materials of the standard language. The dialects of the U. S. have not been clearly defined and characterized, but collections of material are made by the American Dialect Society. See Language.

Dial'ysis, separation of certain substances by means of liquid diffusion. The dialyzer is usually a hoop on a low, broad glass bell jar, open above as well as below. A piece of wet parchment paper is stretched over the hoop and securely tied in place. The fluid to be dialyzed is poured into the hoop to the depth of half an inch, and the whole is floated on

distilled water. Crystallizable bodies, or crystalloids, as common salt, nitrate of potassa, etc., and bodies closely allied to them, such as hydrochloric acid and alcohol, pass rapidly through the membrane into the water; while bodies which do not crystallize, but are inclined to assume the gelatinous form, such as silicic acid, hydrated alumina, starch, gum, caramel, tannin, albumen, gelatin, and extractive matters diffuse with extreme slowness. Such bodies are called colloids. Dialysis is specially useful in examining animal fluids for poisons where the presence of the colloids interferes with the ordinary tests. Arsenious acid may be separated in twenty-four hours from the contents of a stomach in sufficient purity to be recognized immediately by the usual tests. Tartar emetic, morphine, strychnine, and, in fact, almost all soluble poisons, may be thus separated. See DIFFUSION.



DIALYZER.

Di'amond, mineral, the hardest known substance, and the only gem that is combustible or that phosphoresces by attrition. Diamonds can be split by cleaving them on the cleavage parallel to the octahedron, and are cut by rubbing two of them together until they assume the desired form. They are then polished by being ground on a disk of soft steel about a foot in diameter covered with diamond dust and oil, the wheel or disk making about 3,000 revolutions a minute. They are generally cut in what is known as the brilliant form, having a flat table surrounded with thirty-two facets on the upper side, the small point called the culet, and twenty-four facets on the back. Rose diamonds are flat on the back and brought to a point above, the upper or dome-shaped side consisting of triangular facets. Their weight is but one third that of a brilliant of the same surface.

At present over ninety-eight per cent of the diamonds newly mined are produced at or near Kimberley, S. Africa, where they have been mined since 1870, in what is known as the blue stuff, an altered peridotite (a volcanic rock) inclosing pieces of a shale rich enough in carbon to be ignited with a match. It is believed that when the volcanic intrusion broke through this shale, the diamonds resulted from the distillation of a volatile hydrocarbon. Since 1868 more than $300,000,000 worth of rough diamonds, about $750,000,000 after cutting, have been produced here—more than the entire world's yield for two hundred years before the discovery of these mines. In Brazil, India, and Borneo, diamonds have always been found in an alluvial deposit, but the mines have almost ceased to yield. Diamonds have been found in Virginia, N. Carolina, Georgia, Wisconsin, Idaho, and California, but the entire product of all these states could be held in the palm of the hand.

Many attempts have been made to produce diamonds artificially, but the only successful one up to the present time, was made by Henri Moissan, a French chemist who made pure diamonds which, however, were too minute for practical use. He melted iron in the electric furnace and saturated it with carbon, the furnace being at a temperature of over 4,000° C. The furnace was then plunged into cold water, the resulting ingot being treated with hot aqua regia to dissolve the iron and lay bare the diamonds.

Blue, red, and green diamonds are the most highly prized, the red even more highly than the ruby, a ⅛-carat stone being sold for $1,200. Fine shades of brown and yellow command very high prices. Among the largest diamonds is the Victoria or Imperial diamond, purchased by the Nizam of Hyderabad for over $1,500,000. It is a perfect blue-white oblong brilliant, weighing 180 carats. The De Beers light-yellow diamond weighs 225 carats, and was bought by an E. Indian potentate. The Regent or Pitt diamond, weighing 136 carats, now in the Galerie d'Apollon in the Louvre, is perhaps overestimated at $2,400,000. The Kohinoor ("Mountain of Light"), at Windsor Castle, weighs 102¾ carats. (The stone exhibited with the jewels in the Tower of London is only a glass model.) The largest diamond in America is the Tiffany yellow, weighing 125⅜ carats. The Hope diamond, privately owned in England, is almost sapphire blue, and weighs 44½ carats. The Dresden Green, at the Green Vaults at Dresden, Saxony, is a rich light green, and weighs 48½ carats. The red diamond of Czar Paul, weighing 10 carats, is at St. Petersburg. In 1905 in the Premier mine in the Transvaal was found the biggest diamond in the world—the Cullinan—sent to England as a birthday present from the Transvaal Govt. to King Edward VII, and by him sent to a famous diamond-cutting firm in Amsterdam. In the rough this stone weighed 3,027 carats, or a pound and a half, and cost $1,000,000. Its unique character gives it a value of above $2,500,000. In 1909 the cutting and polishing was finished and the jewel was placed with the other crown jewels in the Tower at London.

Diamond Neck'lace, celebrated necklace containing 500 diamonds, and valued at 1,800,000 livres (about $400,000); made, 1773–75 by order of Louis XV for Madame du Barry, his mistress. Before it was finished the king died, and Du Barry was excluded from court. In 1783–84 the Prince Cardinal de Rohan was persuaded by the so-called Countess Jeanne de Lamotte-Valois, an unscrupulous adventuress, that the queen, Marie Antoinette, regarded him with interest, which would be increased if he would assist her in buying the diamond necklace by becoming her surety for the payment of its price to the makers of the ornament. The cardinal agreed to stand surety for the payment. The necklace was delivered to him, but it was stolen, broken up, and sold

in pieces. The jewelers, not having received their pay, went to court and made complaint. The cardinal and others were thrown into the Bastile; as also was Cagliostro, an impostor who had persuaded the cardinal that he was exerting in the latter's behalf great power of magic. The trial, 1785–86, proved the guilt of no one but the Countess Lamotte, who, with her husband, was branded on each shoulder and sentenced to life imprisonment, from which she afterwards escaped to London, where she died, August 23, 1791. The details of the affair attracted general attention, and were so discreditable to the court that they contributed not a little to the popular tumult which resulted in the French Revolution.

Dia'na, Roman divinity, corresponding to the Greek Artemis, daughter of Zeus and Leto or Latona, and twin sister of Apollo. As sister of the sun god, she was goddess of the moon. She was the guardian of young girls and of women in childbirth, but was herself a virgin, and her ministers were vowed to chastity. In Arcadia she was the patron of hunting and sylvan sports. In Tauris she was worshiped with human sacrifices. The Ephesian Artemis was the personification of the fructifying powers of nature, and was represented as a goddess with many breasts.



DIANA.

Diana of Poitiers (pwä-tyä'), 1499–1566; mistress of Henry II of France; married at the age of thirteen to Louis de Brézé, after whose death (1531) she became a favorite of the king's son, who (1547) ascended the throne as Henry II, and created her Duchess of Valentinois, 1548. She had great influence over the king, who permitted her to exercise royal power and control his foreign policy. She maintained her ascendency until the death of Henry in 1559, and spent large sums in charity.

Diana, Tem'ple of, at Ephesus; one of the Seven Wonders of the World; built at the common charge of all the Asiatic states. The chief architect was Chersiphron; and Pliny says that two hundred and twenty years were employed in completing this temple. It was 425 ft. long, 225 broad, and was supported by 127 columns of Parian marble 60 ft. high, some of which were peculiar in that a belt of figure sculpture in relief surrounded the lower part of the shaft. It had immense riches, and was, according to legend, the eighth temple built on the site. The seventh temple had been set on fire on the night of Alexander's birth by an obscure person named Erostratus, who confessed on the rack that his motive was the desire of transmitting his name to future ages (356 B.C.). The famous eighth temple was burned by the Goths in their naval invasion (256 A.D.).

Diapa'son, in music, among the ancient Greeks, the interval of an octave; the consonance obtained by going through all the strings of the lyre from first to last. In France it came to mean a tuning fork and the pitch registered by it. The *diapason normal*, the standard of pitch generally recognized in France, gave 435 vibrations for the A above middle C. The name is also given to the most important foundation stops of the organ.

Diaphragm (dī'ă-frăm), or **Mid'riff**, thin wall of muscle and other tissue which in mammals separates the abdominal cavity from the thorax. Its center in man is occupied by the cordiform tendon or trifolium (trefoil), so called from its shape, which roughly resembles a clover leaf (Latin *trifolium*). The diaphragm is attached to the vertebral column by two muscular buttresses or pillars called *crura*. It is traversed by the phrenic (internal respiratory) nerves, and, like the other respiratory muscles, is partly involuntary. In forcible inspiration it is drawn down like the piston of an air pump. It is one of the principal agents in the various expulsive acts, and also in sneezing, coughing, and laughing. Hiccough is a spasm of the diaphragm.

Diarbekir (dē-ăr-bē-kĕr), in Turkish, KARA-AMID; town of Asiatic Turkey; capital of a pashalic of the same name; on the Tigris, near its source, and 200 m. NE. of Aleppo; inclosed by a high, strong stone wall flanked with towers; the seat of a Nestorian and a Jacobite patriarch, and of a Catholic and an Armenian bishop, and has numerous handsome mosques, bazaars, and khans; formerly a populous city, and had extensive manufactures of silk and cotton, but these have declined. Pop. (1900) 34,000.

Diarrhe'a, affection characterized by frequent soft intestinal discharges. The causes of diarrhea are numerous, and the condition must be considered as a symptom of many diseases rather than a disease itself. The treatment of diarrhea requires a close consideration of its cause. If irritating substances, as improper food, have provoked it, a brisk purge like castor oil or, especially in children, aromatic tincture of rhubarb, should first be given. The diet must in all cases be regulated, especially in children. Mild astringents, like bismuth and prepared chalk, are frequently used with good result. The more active, as iron, lead, and vegetable astringents, require more care, and opium should be given with caution, especially to children, who bear narcotics poorly.

Dias (dē'ăs), **Antonio Gonçalves.** See GONÇALVES DIAS.

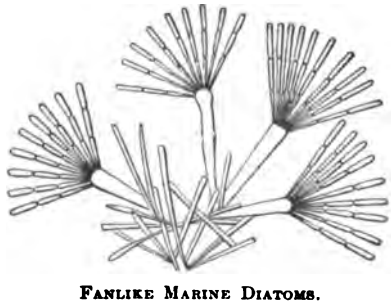
Dias, Bartholomeu, d. 1500; Portuguese navigator; discoverer of the Cape of Good Hope; sailed to explore the W. coast of Africa, 1486; was carried, without knowing it, around the

cape to the E. coast, and on returning, 1487, named it Cabo Tormentoso (Stormy Cape), which the King of Portugal changed to Cabo de Buena Esperanza. He was lost in Cabral's expedition to Brazil.

Di'astase, peculiar substance formed during the germination of seeds, at the base of the sprout, which has the power to convert starch into dextrin, maltose, and dextrose. Saliva has this same power. In making beer, diastase changes the starch into sugars, then fermentation follows.

Diather'mancy, permeability to the rays of heat. Diathermanous bodies have the same relation to heat rays that transparent ones have to rays of light; and those bodies which are impermeable, or opaque, to rays of heat are called athermanous. Pictet was the first to show that radiant heat from obscure as well as from luminous sources would pass through plates of different transparent substances; but it was even then believed by many that the heat was communicated by being absorbed and then radiated by the transmitting body, until Prevost proved the fallacy of this idea by passing rays of heat through ice, of sufficient power to ignite combustible substances.

Diatoms (dī'ă-tŏms), group of the lower *algæ* included in the family *Diatomaceæ*, or *Bacillarieæ*. There are about ten thousand species of diatoms found in fresh and salt water in nearly all parts of the world. They are microscopic one-celled plants of peculiar structure. Many occur as free moving individuals or they may be united into chains or filaments; while still others by the secretion of a gelatinous material become stalked and attach



Fanlike Marine Diatoms.

themselves to plants, stones, etc. The different species vary in size and form, but their structure is essentially the same. The body is encased in a shell of silica and is formed of two valves, one of which slides down over the other like the lid of a pill box. This is a provision for growth and division, the valves sliding apart as the cell enlarges. The shells of diatoms are sometimes found in enormous numbers giving character to geological formations. In both fossil and live condition the shells are often regularly marked with lines and dots. Diatoms have within them color bodies, which, in addition to chlorophyll, contain a golden brown pigment, diatomin, by which the green color is completely masked. Diatoms reproduce mainly by splitting, a cell dividing in the plane parallel to the valve resulting in the formation of two individuals. At other times the contents of two cells escape and fuze together into a single large individual, zygospore. The splitting is an asexual or vegetative method of reproduction common among lower forms of life while the latter method described is one of the lowest forms of sexual reproduction. Diatoms have been recently divided into seventeen groups arranged under two orders. *Centricæ* with circular or oval valves and *Pennatæ* with valves usually boat-shaped or rod-shaped.

Diaton'ic Scale of Col'ors, spaces occupied by the seven primary colors in the solar spectrum, and supposed by Newton to be exactly proportional to the length of strings that sound the seven notes in the diatonic scale of music. It is now known that this theory is not well founded, although there is an analogy between the pitch of sounds and the color of bodies.

Diaz (dē'ăs), **Porfirio,** 1830– ; Mexican general and statesman; b. Oaxaca; studied law, served in the army during the war with the U. S.; commanded a battalion under Alvarez against Santa Anna, 1854; joined the Liberal Party, 1858; appointed political and military commander of the department of Tehuantepec; later promoted to lieutenant colonel; routed reactionary forces, 1859, and was made colonel; deputy in the National Congress, 1861; took the field against the reactionist Marquez and defeated him, for which he was made brigadier general; opposed the French intervention; fought against the French; won distinction at Puebla, 1863; captured, but escaped; made division commander; forced to surrender at Oaxaca, 1865; again escaped; won the famous battle of Carbonera, 1866; captured Puebla and Mexico City, 1867; headed revolts against Pres. Juarez and his successor Lerdo; several times forced to take refuge in the U. S.; President of Mexico, 1876–77 and after 1884.

Diaz de la Peña (dē'ăth dā lă pān'yă), **Narcise Virgilio,** 1808–76; French landscape and figure painter; b. of Spanish parents at Bordeaux; was a painter on porcelain, and began to paint without instruction. His figure pieces are merely excuses for color compositions, and many of them are beautiful in color harmony. He was one of the great landscape painters of the Fontainebleau group, and in some of his works attains a very high level. His pictures of the forest of Fontainebleau are those which have made his reputation; "The Storm" is in the Walters collection, Baltimore.

Diaz del Castillo (dĕl kăs-tēl'yō), **Bernal,** abt. 1498–1593; Spanish soldier and author; b. Medina del Campo; went to Darien with Pedrarias, 1514, as a common soldier; soon after drifted to Cuba; was with Francisco Hernandez de Cŏrdoba, 1517, when Yucatan was discovered; and with Grijalva during the exploration of the Mexican coasts, 1518. On his return enlisted with Cortes (1519), and served through the subsequent campaigns and in the siege of Mexico, never rising above subaltern offices. He then marched with Alvarado

to Guatemala, and was one of the first settlers of Santiago de los Caballeros. In 1668 he began to write his "True History of the Conquest of New Spain," which was intended as a refutation of Gomara's history, but it remained unpublished until 1632. It is perhaps the best original authority for the history of the conquest of Mexico.

Diaz de So'lis, Juan. See SOLIS.

Dib'din, Charles, 1745–1814; English song writer; b. Southampton; composed over 1,000 sea songs, of which "Tom Bowling" is most widely known.

Dibdin, Thomas Frognall, 1776–1847; English bibliographer; b. Calcutta; took orders as a priest, 1804; published, besides other works, "Bibliomania," 1809, a new edition of Ames's "Typographical Antiquities of Great Britain," four volumes, 1810–19; "Bibliographical Decameron, or Ten Days' Pleasant Discourse over Illuminated MSS.," 1817; and "Reminiscences of a Literary Life," 1836.

Di'casts, Athenian citizens, 6,000 in number, chosen yearly by lot from the body of freemen to assist in the administration of justice; divided into ten sections, before which causes were tried. The leading points of law and evidence were previously ascertained before a magistrate, and the conflicting issues were reduced to a formal statement called the *anakrisis*. This was carried for decision before a section of the dicasts, who were supreme judges of the law and the fact. They were kept in ignorance of the cause which was to come before them.

Dice (dī'sē), in Greek mythology, the goddess of justice, daughter of Zeus and Themis, and sister of Sunomia (good rule) and Irene (peace).

Dice (plural of **Die**), small cubes used in playing certain games of chance; made of bone, ivory, or close-grained wood, having their six sides marked with dots or pips, from one up to six. These dots are so arranged that the numbers on two opposite sides taken together always count seven. The dice are shaken in a box called a dice box, and then thrown on a board or table, and the number of dots on the upper faces decide the game. The invention of dice is variously ascribed to the Greeks and Egyptians, and by Herodotus to the Lydians.

Dichotomy (dī-kŏt'ŏ-my), artificial system for the arrangement of natural objects, based upon principles of binary distinction. In logic, the division of a class into two subclasses, which are opposed to each other by contradiction. In anthropology, the recognition of two factors, and only two, in man—the physical and the spiritual—contrasted with trichotomy, which recognizes in man three factors—*viz.*, body, soul, and spirit.

Di'chroism, property possessed by some crystallized bodies of showing two different colors, according to the direction in which light passes through them. Dichroism in physiological optics is a term frequently applied to color blindness, because the color-blind individual possesses a system of colors based on only two of the three primaries of the trichroic or normal eye.

Dick'ens, Charles, 1812–70; English novelist; b. Landport, Portsmouth; son of John Dickens, who held a position in the navy pay department; undertook to study law, but became a reporter on the *True Sun* and later on the *Chronicle*; to the latter contributed his "Sketches of Life and Character," which he published (1836) as "Sketches by Boz," Boz being a nickname of a younger brother. They were followed by the "Posthumous Papers of the Pickwick Club," 1837, which first appeared as a serial. He married (1838) Catherine, daughter of George Hogarth, a musical critic, and in that year published "Oliver Twist"; 1839, "Nicholas Nickleby"; 1840–41, "Master Humphrey's Clock," "Old Curiosity Shop," "Barnaby Rudge."

He visited the U. S. in 1842, and satirized its people in "American Notes"; brought out "Life and Adventures of Martin Chuzzlewit," 1843–44; "Dombey and Son," 1848; "David Copperfield," 1850. Among other works are "Bleak House," 1852; "Hard Times," 1854; "Little Dorrit," 1857; "A Tale of Two Cities," 1860; "Great Expectations," 1862; and "Our Mutual Friend," 1864–65. "The Mystery of Edwin Drood" (unfinished at his death). He gave public readings from his works in the U. S., 1867–68. In 1850–59 he published *Household Words*, a weekly periodical; then started *All the Year Round*, a similar periodical. He purchased Gadshill Place, near Rochester, 1857, and made it his home till death; separated from his wife, 1858; was buried in Westminster Abbey.

Dick'inson, Emily, 1830–86; American poet; b. Amherst, Mass.; a recluse nearly all her life; printed but three or four poems; collections of her verse were published, 1890, 1892, and of her letters, 1894. An Arabic translation of some of her work ran through several editions.

Dickinson, John, 1732–1808; American statesman; b. Maryland; practiced law in Philadelphia; deputy to the first Colonial Congress, 1765; member of the Continental Congress, 1774, and wrote for that body several important state papers, among which was a "Declaration to the Armies"; spoke against the Declaration of Independence, 1776, which he regarded as premature; and was one of the few members of Congress who did not sign it. He consequently became unpopular, and was defeated in the next election, but served as a private soldier in the War of Independence; in 1779 he represented Delaware in Congress; was President of Pennsylvania, 1782–85; founded and endowed Dickinson College at Carlisle, Pa., 1783.

Dicotyle'dons, subclass of higher flowering plants (*Angiosperms*); characterized by having their first leaves (cotyledons) in pairs, the veins of the later leaves mostly netted, the parts of their flowers commonly in fives, and the woody bundles of their stems arranged in layers around a center. There are exceptions to every one of the foregoing char-

acters, and it is only by the general agreement of the characters that the subclass is defined.

Here are included all the trees of N. climates, as well as most shrubs and herbs. In woody plants the stems of *dicotyledons* are distinguished from those of the other subclass (*monocotyledons*) by having distinct pith, wood, and bark, but this does not serve to separate them from those of the *Conifers* among the *Gymnosperms*. In fact, the resemblance of the stems of *dicotyledons* to those of the *Conifers* led the older botanists to include all *Gymnosperms* in the *dicotyledons*, ignoring the profound differences in the ovule, and ovuliferous leaves. The real relation of these groups to one another is more as follows:

Spermatophyta, or Phanerogamia.	Class II. Angiosperms.	Sub class II. Dicotyledons.
	Class I. Gymnosperms.	Sub class I. Monocotyledons.

The *dicotyledons* include many orders, many families, and over 80,000 species. See Acotyledonous Plants; Monocotyledons.

Dicta'tor, magistrate of ancient Rome invested with extraordinary authority and recognizing no superior; elected in cases of special danger to the republic; held office for six months, but might be reëlected if the state still needed his services. The senate decided when it was necessary to elect a dictator, and made over to one of the consuls the power of nominating a man to the office. In the exercise of his authority he recognized no superior. The first dictator was chosen during the war with the Latins, 500 B.C.; the last held office 202 B.C.

Dic'tionary, compilation whose distinguishing characteristic is the arrangement of its subjects according to some stated principle connected with the form of their names, usually the principle of alphabetic order. In its original and proper use the term was limited to books in which the subjects treated were words or names, but it is now extended to books treating of other subjects. Thus we have dictionaries of biography, antiquities, politics, history, history of particular countries, geography, statistics, heraldry, medicine, natural history, philosophy, arts and manufactories, quotations, conversation, the Bible, etc. There are dictionaries of things as distinguished from word books or dictionaries proper. The dictionary of things which undertakes to cover all knowledge is called an encyclopedia or cyclopedia. There are a number of terms in current use partly synonymous with *dictionary*, and partly indicative of subordinate classifications. *Lexicon* is most commonly applied to dictionaries of Greek, Latin, and Hebrew, but may be applied to any dictionary of a dead or foreign language. *Thesaurus* is sometimes used for the more extensive lexical works involving copious citations and discussions, while a thesaurus dictionary is one in which the words are grouped according to meaning instead of alphabetically. *Vocabulary* refers to a word list with concise definitions accompanying a special text or extract. A *glossary* is properly a collection of rare, obscure, dialectal, or antiquated words with no attempt at completeness in any line. *Idioticon* applies to a collection of the words of a single dialect. *Onomasticon* is a collection of names or of the technical terms of a science or art. Closely related to the dictionary is the *concordance*, which arranges the material of an important work or set of works in passages or phrases, classifying them according to prominent words or catch words, and indicating the book, chapter, verse, or line of their occurrence. A list of the words or word forms in an author or work alphabetically arranged with reference to the passages where they occur is called an *index*. *Gazetteer* is often applied to dictionaries of place names, *i.e.*, geographical dictionaries. See Cyclopedia; Gazetteer.

Dic'tys of Crete, reputed author of a history of the Trojan War. The manuscript, written in Phœnician characters, but in the Greek language, is said to have been found in the author's tomb at Cnossus in the reign of Nero. A Latin version, regarded as spurious, was the chief basis of the mediæval literature relating to the siege of Troy.

Didac'tic, teaching, imparting instruction. Didactic poetry aims chiefly to teach some art, science, or system of philosophy; among the most remarkable examples are Lucretius's "De Rerum Natura," designed to explain and defend the philosophy of Epicurus; Vergil's "Georgics" (a treatise on agriculture); and Horace's "De Arte Poeticâ." Many fine didactic poems have also been written in modern times, among them Vida's "Art of Poetry," Boileau's "Art of Poetry," Pope's "Essay on Criticism," and "Essay on Man," Erasmus Darwin's "Botanic Garden," and most of Cowper's longer poems.

Diderot (dē-drō'), **Denis**, 1713–84; French philosopher; b. Langres; educated for the Church, but devoted himself to literature; published several books marked by liberalism and boldness, 1745–49; the last of which procured him the acquaintance of Voltaire and three months' imprisonment at Vincennes. On his liberation, in conjunction with D'Alembert, he planned the "Encyclopédie." Its professed aim was to present in a single work the truths of science, the principles of taste, and the processes of all the arts; but it was in fact a vehicle for the diffusion of new ideas, and its publication was much impeded by official opposition. He wrote nearly all the articles on ancient philosophy, all those on the trades and industrial pursuits, and, after the withdrawal of D'Alembert, had the supervision of the whole. In 1757–78 he produced two domestic dramas. "Le fils naturel" and "Le père de famille," which paved the way to the change afterwards accomplished in French dramatic style. He also wroter two novels "Jacques le fataliste" and "La religieuse."

Did'ius, Salvius Julianus, 133–193 A.D.; Roman emperor; b. Milan; had a high command in the army; chosen consul with Pertinax, after whose death, 193 A.D., the prætorians offered the empire at public auction to the highest bidder. Didius, who was very rich, gave 6,250 drachmas to each soldier, and was pro-

claimed emperor. After reigning nearly two months he was killed in his palace by his soldiers; succeeded by Severus.

Di'do, or Elis'sa, daughter of the Tyrian King Belus or Agenor, after whose death she and her younger brother Pygmalion were to reign conjointly; but Pygmalion, aided by democratic partisans, usurped the whole authority, and procured the assassination of her husband and uncle (the Sichæus of Vergil). She then fled with many Tyrians by sea, and founded Carthage about 870–860 B.C. Hiarbas, King of Numidia, demanded her in marriage, threatening war in case of refusal, and to escape this fate Dido stabbed herself on a funeral pile. Vergil has been charged with an anachronism in representing her as contemporary with Æneas.

Didon (dē-dōṅ'), **J. Henri,** 1840–1900; Dominican preacher and writer; b. France; attracted much attention by his eloquent Lenten sermons. Having come into conflict with his superiors because of his views about democracy, he ceased for a time to preach, and spent his leisure in preparing a life of Jesus which should be an antidote to the skeptical "Vie de Jesus" of Renan. The result was his "Jésus Christ," two volumes, 1891, a book which moved Paris and France deeply.

Didot (dē-dō'), **François,** 1689–1757; French printer; b. Paris; founded there a famous house of printers and type founders. The business was carried on by his sons, François Ambroise (1730–1804), who made improvements in the printing press and paper manufacture, and Pierre François. Of the sons of the former, Pierre (1760–1853) took charge of the printing house, 1789, and published magnificent folio editions of Vergil, Horace, Racine, and other classics; and Firmin (1764–1836) took charge of the type foundry, improved the art of stereotyping, and became known also as an author and translator. His business was inherited by his sons, Ambroise Firmin (1790–1876) and Hyacinthe Firmin (1794–1880); and that of Pierre by his son Jules.

Didron (dē-drōṅ'), **Adolphe Napoléon,** 1806–67; French archæologist; b. Hautvillers. He began in 1844 to publish "Annales Archéologiques," devoted to mediæval art and antiquities, which he continued to twenty-seven volumes; it is a valuable storehouse of mediæval art and archæology. His chief works are a "Manual of Christian Iconography," translated from an ancient manuscript, and "Christian Iconography," 1843, which forms a history of the representations of the persons of the Trinity in art, their attributes, etc.

Didym'ium, element separated by Mosander, 1842, from the mineral cerite. Its occurrence with lanthanum led to the name didymium (Latin *didimus*, a twin) which refers to the twinlike relation between the two metals. Didymium is more closely allied to bismuth than to any other common element. Its chemical symbol is Di, and its atomic weight about 143.

Did'ymus (The Blind), 308–395 A.D.; one of the most learned men of his age; b. Alexandria; became blind in his fifth year; was at the head of the theological school in Alexandria from 390 till his death. Extant works are a treatise on the "Spirit," the "Trinity," "On the Canonical Epistles," and "Against the Manichæans."

Didymus of Alexan'dria, surnamed **Chalcenterus,** b. abt. 63 B.C.; Greek grammarian; lived in Rome, and is said to have written more than 3,500 "books," chiefly commentaries on Greek authors. To Didymus and his excerptors we owe much of our knowledge of the investigations of the Alexandrian scholars.

Die, in coinage, the instrument by which impressions are stamped upon coins. The device is first engraved by hand upon forged steel, which is softened by heating, and which, when complete, is hardened and is called a *matrix*. From this coins, medals, etc., could be struck directly, but it is usual to make dies from it by means of a punch. By a powerful fly press, an impression in *relief* is taken upon another piece of soft steel, which, when shaped and hardened, is called the *punch*. From this again impressions upon steel are taken, which, being shaped and tempered, are the *dies*, and are, of course, exact reproductions of the original die or matrix. A good pair of dies will yield from 200,000 to 300,000 impressions before becoming too much worn. The engraving of dies, or *die sinking*, has grown in importance from the extension of the process of stamping metal. Much work formerly made by the hammer and punch is now shaped by a few blows between dies. Such is the ornamental work of gas fittings, buttons, common jewelry, ornamental trays, dishes, boxes, small parts of firearms, etc. For these a pair of dies is required—one in relief, the other in intaglio—and the metal is pressed between them. The cheapness of many metallic wares is due to the use of dies for doing by a single blow the work that formerly required tedious manipulation.

Die, in architecture, that part of a pedestal which lies between its base and its cornice.

Die (plural **Dice**). See **Dice.**

Diebitsch (dē'bĭtch), **Hans Karl Friedrich Anton,** 1785–1831; Russian general; b. Grossleippe, Silesia; educated at the military school of Berlin, but quitted the Prussian service for that of Russia, 1801; he was present at the battles of Austerlitz and Friedland; served with distinction in the campaign of 1812; took part in the battles of Dresden and Leipsic, and was made lieutenant general at the age of twenty-eight. He had the chief command in the Turkish War of 1828–29; stormed Varna; and made the famous passage of the Balkans, for which the surname of Sabalkanski was conferred on him. He penetrated almost to Constantinople, which was expected every moment to fall into his hands, but the jealousy of the Great Powers brought about an adjustment in the Treaty of Adrianople, September 14, 1829. He was raised to the rank of field marshal, and in January, 1831, took command of an army sent to subdue the Polish insurgents.

Diefenbach (dē'fĕn-bäkh), **Lorenz,** 1806–83; German philologist; b. Hesse-Darmstadt;

founder of the German Catholic Church at Offenbach, 1845; member of the Frankfurt Parliament, 1848; fame rests on his great treatises on the Germanic, Celtic, and Latin languages.

Dieffenbach, Johann Friedrich, 1794–1847; Prussian surgeon; b. Königsberg; began to practice in Berlin, where he gained a high reputation; professor in the university there, 1832; especially noted for his plastic operations.

Die'go Gar'cia Is'land. See CHAGOS ARCHIPELAGO.

Dielec'tric, in electricity, any medium within which it is possible to set up an electrostatic field of force; in other words, any substance through which electrostatic induction will take place. Dielectrics are, as a class, insulators rather than conductors of electricity. Solids, liquids, and gases alike possess the dielectric property, although in varying degrees. The dielectric value (specific inductive capacity) of each substance is measured by the ratio of the capacity of a condenser in which it forms the insulator, to the capacity of the same condenser with a vacuum as the dielectric.

Diemen (dē'mĕn), **Anthony van,** 1593–1645; Dutch naval officer; b. Kuilenburg, Holland; served for many years in the E. Indies; became an admiral; was appointed Governor General of the Dutch E. Indies, 1636, and sent (1642) an exploring expedition under Abel Tasman, who discovered Van Diemen's Land, better known as Tasmania.

Dieppe (dē-ĕp'), seaport of France; department of Seine-Inférieure; on the English Channel; at the mouth of the Arques; 143 m. NW. of Paris; stands between two high ranges of chalk cliffs, and is defended by a wall and a castle built on a high cliff. Vessels of 500 tons can enter the harbor at high water, but at low tide the harbor is nearly dry. Dieppe has a college, a school of navigation, public library, and manufactures of watches, lace, fine linen, paper, and ivory wares; also shipbuilding, distilling, and fishing industries. In the fifteenth and sixteenth centuries its commercial importance compared favorably with that of the Italian cities. It became a center of Protestantism, and its inhabitants were among the first to support Henry IV. No city of France suffered more severely from the Revocation of the Edict of Nantes (1685). It is one of the most fashionable watering places of France. Pop. (1900) 22,839.

Di'es I'ræ, Latin hymn, probably written in the thirteenth century by a Franciscan friar, Thomas da Celano, commencing—

> Dies Iræ, dies illa,
> Solvet sæclum in favilla,
> Teste David cum Sibylla.
>
> Day of Wrath! On that dread day
> In ashes earth shall pass away—
> Attest the King's, the Sibyl's, lay.

The W. Church soon gave it a place in its offices as the "Sequence for the Dead," so called because in the Roman mass it is sung between the Epistle and the Gospel, following immediately after the Gradual Hymn, when that is sung. In an English form it has also been adopted into the hymn books of the Church of England and others. It is chief among the "seven great hymns of the mediæval Church."

The translations into modern languages are numbered by scores. Among the versions complete or incomplete in English may be mentioned the condensed rendering by Sir Walter Scott in the "Lay of the Last Minstrel," that of Gen. John A. Dix, and thirteen versions by Dr. Abraham Coles. The words of the "Dies Iræ" constitute the principal subject of the music of the "Requiem" of Mozart.

Dieskau (dēs'kow), **Ludwig August,** 1701–67; German military officer in French service; b. Saxony; adjutant to Marshal Saxe, 1741; accompanied him in the Netherlands campaigns; became major general of infantry; sent to Canada to assist against the English, 1755; at head of force of Indians, Canadians, and regulars undertook to attack Fort Edward on Lake Champlain, but his guides took the road to Lake George (N. Y.) by mistake; encountered a force of Massachusetts militia under Col. Ephraim Williams and was signally defeated, wounded, and taken prisoner.

Di'es non, or, in full, **Dies non juri'dicus,** any day that is not a court day; a day upon which courts do not sit, and upon which process cannot ordinarily issue, be executed, or returned. Every legal holiday is a *dies non,* as well as such other days as may be fixed by law.

Di'et, term corresponding to parliament, congress, etc., applied to the national or provincial assemblies of various countries; is derived from the Latin *dies,* day, as meaning a day fixed for national deliberations. The diet (*Reichstag*) of the old German Empire had its rise after the dissolution of the Frankish Empire, and was slowly developed and repeatedly modified under the successive German houses, receiving its ultimate modifications by the Treaty of Westphalia, 1648, and the regulations adopted at Ratisbon, 1663. The diet consisted of three divisions, the so-called colleges of electors, princes, and imperial cities. The electors and cities had individual votes, as well as the chief members of the college of princes, while the imperial counts and imperial prelates, who belonged to the latter, had only collective votes, by benches. Resolutions were, with some exceptions, passed by majority, but the concurrence of all the three colleges and the ratification of the emperor were required to establish a decree of the empire (*Reichsschluss*). The collection of resolutions passed and sanctioned by a diet was termed "imperial recess." The administration of the Germanic confederation (1815–66) was vested in a diet, the members of which were appointed by the various governments.

Dietet'ics, that branch of medicine which treats of food and drink. In a wider sense it may treat of the recovery or maintenance of health by means of correct habits with regard to eating, drinking, exercise, the wearing of proper clothes, etc. See DIGESTION; FOOD; HYGIENE.

Dietz (dēts), **Feodor**, 1813–70; German painter; b. Baden; most celebrated works, "Death of Gustavus Adolphus and Pappenheim," "Storming of Belgrade by Max Emanuel," "Queen Eleonore at the Grave of Gustavus Adolphus," "March to Paris in 1814," and "Siege of Vienna."

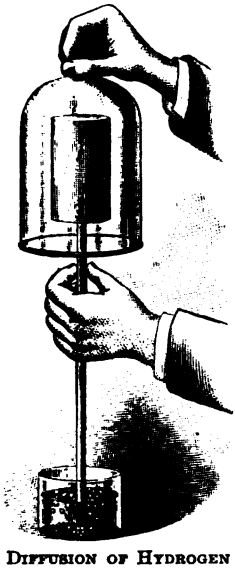
Dieulafoy (dē-ö-lä-fwä'), **Marcel Auguste**, 1844– ; French engineer and archæologist; b. Toulouse; became famous for his explorations in the monuments of Persia, described in his "Ancient Art of Persia," 1884–89, and his "Acropolis of Susa," 1890. In his work he was assisted by his wife, Jane Paule Rachel (b. Toulouse, 1851), who individually published "Persia, Susiana, and Chaldea," 1866; "At Susa," 1887; and "Parysates," 1890, which was crowned by the French Academy.

Diez (dēts), **Friedrich Christian**, 1794–1876; German philologist; b. Giessen; Prof. of Philology at Bonn from 1830 till death; founded the scientific study of Romance philology; best remembered by his grammar (three volumes, 1836–42) and etymological dictionary of the Romance languages (1853)

Differen'tial Cal'culus. See CALCULUS.

Diffrac'tion Gra'ting. See SPECTROSCOPE.

Diffu'sion, gradual mixing of two gases, liquids or even solids, due to the mutual attraction of their molecules. If a jar containing hydrogen is placed, mouth down, over a jar containing chlorine the two gases will mix, the hydrogen, notwithstanding its lightness, penetrating down to the bottom of the chlorine jar, so that the two jars will soon contain a uniform mixture of the gases. A heavy liquid, such as oil of vitriol, may be carefully poured through a tube to the bottom of a tall jar filled with water; without any stirring —which would merely bring large surfaces of the liquid into contact — the sulphuric acid will gradually spread up through the water, and the rate of the diffusion may be measured if the water has been tinted with blue litmus, as the contact with the acid will charge the blue tint to pink. This spontaenous mixing of fluids of differing densities will take place even if between them is placed a porous plaque of earthenware, and when the diffusion takes place through a living membrane it presents the important physiological phenomenon of Osmosis (q.v.).



DIFFUSION OF HYDROGEN THROUGH POROUS CUP.

Between solids, the rate of diffusion is vastly slower than between liquids or gases, but it does occur. Carbon has become diffused through iron, and a plate of lead placed for a long time in contact with gold has been found to be permeated with some of the gold. Some substances, such as quicksilver and water, do not diffuse, while the differing diffusive properties of other substances are availed of in the process known as dialysis (*q.v.*).

Di'gest, a condensation or systematic arrangement of laws, statutes, or decisions; often applied to the Pandects of Justinian.

Digest'er, Pap'in's (named from DENIS PAPIN, a French savant, who invented it in 1861), an apparatus by which bodies may be subjected to the action of high-pressure steam or water raised above its ordinary boiling temperature to 400° F., and sometimes higher. It is a strong boiler made of copper or iron with a tightly adjusted cover furnished with a safety valve. It will dissolve bones to a jelly, and has been employed in France in preparing soup from bones. It is also used in paper making in preparing pulp from wood.

Diges'tion, process of converting food into assimilable substances. The organs by which this function is performed in the higher animals are the mouth, pharynx, esophagus, stomach, and intestines, with their accessory glands, the pancreas, liver, and mucous follicles. In man digestion comprises a number of stages, beginning with the action of the saliva and ending in the intestines. In the mouth the starches of the food are converted into grape sugar by the action of a ferment, ptyalin, of the saliva. The sugar so produced is absorbed by the blood vessels of the stomach and any starch not thus digested is acted upon in the intestines by a ferment similar to ptyalin, though much less active. It will appear from this that thorough mixture of the food with the saliva is necessary and that mastication must be carefully performed. In the stomach the albuminous portions of the food are particularly acted upon. The food is thoroughly commingled with the gastric juice by the churning movement of the stomach walls. The gastric juice is a clear yellowish fluid, containing free hydrochloric acid, and various mineral ingredients, chief among which is sodium chloride (common salt). Its most important organic constituent is pepsin. About 14 lbs. of gastric juice is secreted daily, the secretion resulting largely from the mere presence of something within the stomach, as there is very little secretion when the stomach is at rest. The important function of the gastric juice is the conversion of albuminous substances into peptones, and this is accomplished by the ferment pepsin, acting by its presence rather than by itself entering into the chemical changes. There is little action on starches or fats in the stomach, but milk is curdled by the operation of a special ferment (rennin) assisted by the acidity of the gastric juice. The name chyme is applied to the stomach contents when digestion is complete. The peptones produced are largely absorbed by the blood vessels in the walls of the stomach; the

remaining matters pass into the intestines. The chyme having passed into the duodenum (the first part of the small intestine), is further acted upon by the pancreatic juice and the bile. The starches not altered in the mouth are converted, mainly by pancreatic juice, into sugar and so absorbed; albuminous substances unaffected in the stomach are changed into peptones by the trypsin of the pancreatic juice; and fats not at all affected in mouth or stomach are broken up, chiefly by bile, into a fine emulsion or chyle and carried off in the lacteals. The digestive and absorbing power of the large intestine is very slight. See DYSPEPSIA, FOOD, STOMACH, etc.

Dig'gers, originally a small tribe of N. American Indians, living near St. George, Utah; so named because it was the only Paiute tribe practicing agriculture; later applied to every tribe known to use roots for food, and hence to be "diggers"; and so included many of the tribes of California, Oregon, Idaho, Utah, Nevada, and Arizona, speaking different languages and embracing distinct linguistic stocks. In time root eaters came to represent a low type of Indian, and the term became one of opprobrium. There are now a very few Indians retaining the name of Diggers on a reservation near Jackson, Cal.

Dighton (dī'tŏn) **Rock,** mass of silicious conglomerate, with face 11½ ft. long at base and about 5 ft. high, on the bank of the Taunton River, in Bristol Co., Mass., on which is an ancient, probably prehistoric, inscription, copies of which have been sent to the most learned scholars to decipher, but so far without acceptable results.

Digit (dĭj'ĭt), in arithmetic, one of the ten symbols, 0, 1, 2, 3, etc., by which all numbers are expressed. In astronomy the term is used in speaking of eclipses to denote the twelfth part of the diameter of the sun or moon. Thus the eclipse is said to be of ten digits if ten parts of the twelve are concealed. Digit is also a measure of dimension equal to the breadth of a finger, and estimated at about three fourths of an inch. See NOTATION.

Digita'lis, genus of plants belonging to the figwort family. With the exception of the common foxglove (*Digitalis purpurea*), which is a native of Great Britain, the species are mostly found in S. Europe and in Asia. The leaves of foxglove are largely used in medicine. They are dried and reduced to powder or dissolved as an infusion or tincture. They have a bitter taste, and are used in diseases of the heart, to which they act as a stimulant, especially when the heart action is rapid and weak, as digitalis produces a slow, strong pulse. Several of the species are cultivated in gardens.

Dig'itate, botanical term applied to compound leaves, the leaflets of which are all borne on the apex or tip of the petiole, as the clover and horse-chestnut; also called palmate.

Dig'nities, in English law, titles of honor, considered as incorporeal hereditaments; are strictly personal, descending to the heir in the patent whereby they are granted, and not being transferable by voluntary alienation, nor attachable for debt. In the classification of dignities as superior and inferior the names of baronet, knight, etc., designate the inferior dignities. No temporal dignity of any foreign nation can give to a man a higher title than that of esquire in Great Britain; in the U. S. titles of nobility cannot be granted by either state or Federal Govt., and all titles of dignity must be renounced by alien applicants for admission to citizenship.

Dihong (dē-hŏng'), also called TSANPO; upper part of the Brahmaputra River above Assam; rises on the N. side of the Himalayas, traverses part of Tibet, and bursts through that mountain chain near latitude 28° 15′ N.

Dijon (dē-zhōn'), ancient *Dibio,* town of France; capital of the department of Côte-d'Or; on the Ouche, at its junction with the Suzon; about 175 m. SE. of Paris; formerly the capital of Burgundy, and residence of the dukes of Burgundy for three centuries. It is inclosed by ramparts. Among the principal public edifices are the palace of the Princes of Condé; the cathedral, a Gothic structure founded in the thirteenth century; the noble Gothic church of Notre Dame; a theater and townhall. Dijon has a large public library, a botanic garden, and an *académie universitaire*; also manufactures of beer, brandy, woolen cloth, blankets, hosiery, chemical products, cotton fabrics, and pottery. Its prosperity is largely derived from the trade in Burgundy wines, flowers, and agricultural products. Pop. (1906) 74,113.

Dike, a term with several meanings. In engineering a dike is an embankment erected on the shore of a sea or river in order to prevent inundation. Such embankments raised along the Mississippi River are called levees. The coasts of Holland are protected against the encroachments of sea by dikes constructed on a grand scale and in a systematic manner. Dikes are also raised on the banks of the Rhine, Waal, and other rivers near their mouths. They are broad at the base, and are usually of such magnitude that there is room on the top for a public road The fabric is strengthened by willows, either growing or interwoven as wickerwork on the sides of the dike, which should present a very gradual slope toward the sea or river. The base is often faced with masonry, and protected by vast heaps of stones.

A dike, in geology, is a broad and relatively thin plate of igneous rock, cast into a fissure when in the molten state. The greater number of dikes are approximately vertical. When inserted between the layers of a sedimentary formation, they are called intrusive sheets. Rocks traversed by dikes usually show alteration at and near the surface of contact, due to the heat of the injected liquid. As dikes are laid bare by erosion, their material often proves more resistant than the inclosing rock, in which case they project above the general level in wall-like ridges, whence their name.

Dilem'ma, syllogism with a conditional premise, used to prove the absurdity or falsity of

some assertion. A conditional proposition is assumed, of which the antecedent is the assertion to be disproved, and the consequent is a disjunctive proposition setting forth the supposition on which the assertion can be true. If the supposition be denied, the assertion must also be denied. Thus, the sentence: If he did go he must be either foolish or wicked; but we know he is neither foolish nor wicked; therefore he cannot have gone. The dilemma was called the *syllogismus cornutus* (horned syllogism), the two members of the consequent being the "horns of the dilemma," on which the adversary is caught.

Dilke (dĭlk), **Charles Wentworth**, 1789–1864; English journalist; served for twenty years in the navy pay office; edited the *Athenæum*, 1830–46, and the *Daily News*, 1846–49; also a valuable collection of "Old English Plays," six volumes, 1814.

Dilke, Sir Charles Wentworth, 1843– ; English politician and author; b. Chelsea; grandson of the preceding; called to the bar, 1866; member of Parliament for Chelsea, 1868–86; Under Secretary of State for Foreign Affairs, 1880–82; president Local Government Board, 1882–85; chairman Royal Commission for Negotiations with France, 1880–82; of Royal Commission on the Housing of the Working Classes, 1884–85; defeated for Parliament, 1886, having been the co-respondent in a divorce suit; returned (1892) as a Liberal by the Forest of Dean; succeeded his father and grandfather as proprietor of the *Athenæum*; author of "Greater Britain—a Record of Travel in English-speaking Countries," "Present Position of European Politics," "The British Army," "Problems of Greater Britain"; joint author of "Imperial Defense."

Dill'mann, Christian Friedrich August, 1823–94; German theologian and Orientalist; b. Illingen, Würtemberg; Prof. of Exegetical Theology at Tübingen, 1853; of Oriental languages at Kiel, 1854; of Exegetical Theology at Giessen, 1861; and at Berlin, 1869; distinguished by his works on the Ethiopic language; editions of the old Ethiopic version of the Bible, of the apocryphal book of Enoch, the book of Adam, the book of Jubilees, and the Ascension of Isaiah; also wrote commentaries on the Hexateuch, Isaiah, and Job.

Dill'on, John, 1851– ; Irish politician; b. Dublin; son of John Blake Dillon, a leader in the Young Ireland movement of 1848, who fled to New York to escape imprisonment, and later sat in the House of Commons for Tipperary. John was educated for a physician; first elected to Parliament, 1880; suspended, 1881, the first of the Parnellite group to be so treated, and then imprisoned; several times reëlected, suspended, and imprisoned. Was an aggressive promoter of the "Plan of Campaign"; succeeded Justin McCarthy as leader of the main section of the Nationalist Party, 1896.

Dillon, Wentworth. See ROSCOMMON, EARL OF.

Dilo'lo, Lake, small lake on the S. border of the Kongo Free State, 4,000 ft. above the sea, and so exactly balanced on the water parting between the Kongo and Zambesi systems that one affluent carries a part of its waters to the Kassai branch of the Kongo, while another flows to the Liba head stream of the Zambesi.

Dilu'vium. See DRIFT.

Dimen'sion, in mathematics, the capacity of extension to be measured in some direction. In geometry, a point has no dimensions; a line, whether straight or curved, has one dimension—namely, length; a surface has two—length and breadth; and a solid has three dimensions—length, breadth, and thickness. As the latter is the most general form of extension, space is of three dimensions. Space of four dimensions, an expression used by some mathematicians, is an algebraic term with no corresponding reality.

Dim'ity. See TEXTILE FABRICS.

Dimor'phism, a term having two distinct meanings. In biology, dimorphism is the occurrence of individuals of the same species under two distinct forms, which, were not the connection known, would be regarded as distinct species or even as distinct genera. In many cases the dimorphism is sexual, the male and female presenting entirely different characters. Thus in the cankerworm moth the male is winged, the female lacks the wings. In other cases differences may be seen among the individuals of the same sex. Dimorphism of inorganic matter is the capacity of a substance to crystallize in two distinct forms. Carbon, sulphur, and calcium carbonate are examples. Carbon, as the diamond, crystallizes in octahedra and allied forms, but as graphite it forms hexagonal crystals.

Dinapur (dē-nä-pōr'), town and important military station of British India, province of Bengal; on the right bank of the Ganges, 12 m. above Patna. Here are spacious barracks, and about 3,200 houses, mostly of mud. Pop. (1901) 30,000.

Dinar'chus, one of the ten Attic orators; a native of Corinth who came to Athens abt. 342 B.C. and took up the profession of a composer of speeches; rose to influence under Demetrius Phalereus, and fell with him, 307; after spending fifteen years in exile at Chalcis, in Eubœa, he was allowed to return; died in penury and almost total blindness.

Dinar'ic Alps, name given to the range connecting the Julian Alps with the W. ranges of the Balkan; divides Dalmatia from Bosnia and Herzegovina, and a spur extends into Dalmatia; highest summit is Mt. Orjen, about 6,225 ft.

Ding'dings, The, part of the Straits Settlements colony (British) on the W. coast of the Malay Peninsula; consists of the island of Pangkor, with a small strip of the coast of Perak; is about 30 m. S. of Penang.

Din'go, species of dog (*Canis dingo*) inhabiting Australia. It is somewhat larger than a shepherd's dog, of a tawny color, with erect ears and a bushy tail. The dingo is extremely fierce, and being very destructive to sheep, its numbers have been greatly lessened by the efforts of the colonists. It is remarkable for

being the only dog living both in a wild and in a domesticated state, and also from the fact that it is the sole large terrestrial mammal not a marsupial found in Australia.

Din'ka, or **Den'ka,** people inhabiting about 60,000 sq. m. W. of the White Nile, and between 6° and 9° N. lat. They belong to the darkest of negro races, are clean in their persons and in what they eat, give all their attention to cattle raising, and possess immense herds. Their principal weapon is the lance. The men dispense entirely with clothing, but the women are dressed. Though their tribes fight one another, their union against the Arab slavers has prevented the Khartum raiders from getting a foothold on their soil.

Dinoceras (dī-nŏs'ē-răs), genus of extinct herbivorous mammals from the Eocene of Wyoming and Utah, and the first known representative of a remarkable group now regarded as forming a distinct order, *Dinocerata*. The skull is long and narrow, and supports three separate pairs of osseous elevations, some of which may have been the bony support for horns. The vertebræ are longer than in the elephant, while the legs are short, so that the head could easily reach the ground. The feet were short and stout, and there were five toes before and behind. The brain cavity of *Dinoceras* proves that the brain was smaller than any more recent mammal.

Dinor'nis, gigantic extinct bird, whose bones have been found in New Zealand. It was called *moa* by the natives. Some years before the discovery of these bones, attention had been drawn to remarkable prints in the new red sandstone of the Connecticut River valley, in Massachusetts, which were believed to be footprints of birds, the largest of which must have exceeded the ostrich in size. Geologists were unwilling to admit the existence of birds at this remote epoch, or of such large ones at any time; but the later discovery of the bones of *D. giganteus* demonstrated the existence of birds, at a comparatively recent period, whose tracks would have been 22 in. long and 6 in. wide, considerably larger than those of the Connecticut valley. It was wingless and at least 10 ft. high.



DINORNIS GIGANTEUS.

Dinosau'ria, order of extinct reptiles related to the crocodiles on the one hand and the birds on the other, containing the largest land reptiles and many which often, or habitually, walked on their hind legs. The smallest species were not more than 3 ft. long, while the largest attained a length of 60 ft.

Dinotherium (dī-nō-thē'rĭ-ŭm), genus of extinct mammals apparently related to the mastodon and elephant, but having no tusks in the upper jaw, and two tusks projecting downward and slightly backward from the lower jaw. The skull is broad and flattened, and there are two premolars and three molars on either side of each jaw. Remains of the *Dinotherium* occur in the Middle and Upper Miocene of Germany, France, Greece, Asia Minor, and India.

Dinwid'die, Robert, abt. 1690–1770; British colonial executive; b. Scotland; Lieutenant Governor of Virginia, 1752–58; proposed the annexation of the Ohio valley for extension of British settlements and an alliance with the Miami Indians to secure the settlements against French aggression; appointed Washington adjutant general, sent him to demand withdrawal of French troops from British territory, and placed him in command of the colonial troops for the campaign resulting in Braddock's defeat; recalled, 1758. Several places in Virginia are named after him.

Di'o Cas'sius, 155–235 A.D.; most important Greek historian of the imperial period; grandson of Dio Chrysostomus; b. Nicæa, Bithynia; rose to high position and was twice consul. Of his great "History of Rome," in eighty books, from the landing of Æneas to the accession of Alexander Severus and Dio's consulship of 229, books 36–60 covering the period 68 B.C. to 47 A.D. are extant, mutilated in parts, the rest only in fragments and in excerpts. Dio Cassius is our most important source for the period of which he treats.

Diocletian (dī-ō-klē'shăn), or, in full, **Caius Valerius Aurelius Diocletianus,** 245–313 A.D.; Roman emperor; b. Dalmatia, of humble parentage; abilities secured his rapid promotion in the army, and his popularity with the troops gave him great influence. He served under Carus against Persia, till that emperor's death, 284. When Numerian, the son of Carus, was assassinated, the soldiers chose Diocletian as his successor; he was installed with great ceremony at Nicomedia. In 286 he associated with himself Maximian, his old companion in arms. The empire was beset with enemies, and in 292 two more Roman soldiers, Galerius and Constantius,

were raised to the purple as *Cæsars*, the two older emperors being distinguished as *Augusti*. These four princes, it was thought, would hold one another in check, and the plan was for a time successful. After a prosperous reign of about twenty-one years, Diocletian voluntarily resigned the throne, 305, and retired to Salona. He is censured for permitting the persecution of the Christians, but the greater part of these persecutions took place after his abdication. The year of his accession, 284, was made by the ecclesiastical writers the beginning of an era called "the era of Diocletian."

Diocletian E'ra, called also the ERA OF MARTYRS, on account of the persecution in Diocletian's reign; period in the early Christian chronology dating from the year 284 A.D., when that reign began. The term was employed till the method of reckoning time from the birth of Christ was introduced by Dionysius Exiguus early in the sixth century, and is still used by the Abyssinians and Copts.

Diodati (dē-ō-dä'tē), **Giovanni,** 1576–1649; Swiss theologian; b. of an Italian family at Geneva; Prof. of Hebrew at Geneva, 1597; was Prof. of Theology there, 1609–45; represented the Church of Geneva in the Synod of Dort, 1618, where his reputation was so high that he was one of the persons appointed to write the articles of faith. He produced the Italian (Geneva, 1607) and French (1644) translations of the Bible that are still the most widely circulated, and wrote several treatises against the doctrines of the Roman Catholic Church.

Diodo'rus, called, from the island of his birth, DIODORUS SICULUS; historian of the time of Julius Cæsar and Augustus; spent thirty years in composing a universal history in Greek, in forty books, of which only fifteen entire books and a few fragments remain. These relate chiefly to the ancient history of the Ethiopians, Egyptians, and Greeks, and events from the second Persian War (480 B.C.) down to 302, including the Carthaginian wars in Sicily.

Diog'enes, abt. 412–323 B.C.; Greek Cynic philosopher; b. Sinope; disciple of Antisthenes, and soon gained a reputation superior to that of his master for rough and caustic wit. It is said that one day at Athens the citizens saw him with a lantern in his hand, although it was broad day, apparently searching for something. On being asked what he was seeking, he replied, "A man"; he had found children, he said, in Sparta, and women in Athens, but men he had never seen. He taught in the streets and public places, speaking with the utmost plainness, often with rudeness, was altogether insensible to reproaches and insults, and lived as a voluntary outcast till his ninetieth year. He is said to have written several works, but none is extant.

Di'omede Is'lands, group of three small islands in the middle of Bering Strait, midway between Asia and America.

Diome'des, a Greek proper name; the name of a Greek warrior and King of Argos, celebrated in the ancient legends as a son of Tydeus (hence he was called Tydides), and a favorite of Minerva; in the "Iliad" narrative he fought with distinction at the siege of Troy, and even ventured to attack Mars, who defended the Trojans. Diomedes and Ulysses are said to have carried away the Palladium of Troy. There was a DIOMEDES, King of the Bistones in Thrace; fabled to have fed his horses on human flesh; slain by Hercules. There was also DIOMEDES, Latin grammarian of the fourth century. His treatise on grammar in three books has value, having incorporated much from earlier writers of authority now lost.

Di'on, abt. 410–354 B.C.; statesman of Syracuse; acquired great influence at the court of Dionysius the Elder, who had married Aristomache, a sister of Dion. After the accession of Dionysius the Younger, Dion persuaded him to invite Plato to return to Syracuse. The virtue and austere morals of Dion rendered him obnoxious to the dissolute tyrant and his courtiers. He was banished, and took refuge at Athens. In order to revenge himself and liberate his country, he raised a small body of troops, 357 B.C., attacked Syracuse, which he occupied without much resistance, and expelled Dionysius; was soon deprived of power by the intrigues of Heraclides; was recalled by the people, but assassinated by Calippus.

Dionæ'a, insectivorous plant found only in the moist sandy land near Wilmington, N. C.; popularly called Venus's flytrap; belongs to the same neutral order as sundews, the common species of which captures flies as effectually as dionæa, but by a different contrivance.

Di'on Cas'sius. See DIO CASSIUS.

Dionys'ia, great annual festivals in honor of Dionysus (Bacchus); said to have been introduced into Greece from Egypt, 1415 B.C. They were of four kinds—the rural or lesser, the Lenæan, the Anthesterian, and the great Dionysia. They were chiefly celebrated at Athens. See BACCHANALIA.

Dionys'ius, name of several distinguished Greeks and Romans. DIONYSIUS I, THE ELDER, 431 or 430–367 B.C., was tyrant of Syracuse; served in the war against the Carthaginians, and succeeded by false accusations against his colleagues in being appointed (405) sole general. Aiming to subdue his native city, he played into the hands of the enemy, left the whole SW. coast to them, and bought them off when they besieged Syracuse; was recognized by them as ruler of Syracuse, but was forced to resign all claim to dominion over the island of Sicily as a whole; availed himself of peace to establish his tyranny more firmly, and built an impregnable citadel on the island of Ortygia. Syracuse in six years recovered her strength, and Dionysius made great preparations for the recapture of the cities he had surrendered. He gained at first great success, but his fleet was defeated by the Carthaginians. After several conquests they laid siege to Syracuse (395), but nearly the whole Carthaginian army was lost by a pestilence, and the remainder purchased from Dionysius the privilege

of a free departure. He sought by establishing colonies on the Adriatic to secure for himself a way into Greece; was now the recognized master of S. Italy; sent an army into Epirus, and received an offer of friendship from the Gauls, who had burned Rome. His reign, which lasted thirty-eight years, became milder toward its close. He left an immense military force and a powerful empire; and, though he had governed as a tyrant, the old republican forms remained. DIONYSIUS II, THE YOUNGER, was the son and successor of the preceding; hastened on his accession (367) to conclude a peace with the Carthaginians, abandoned his father's projects of foreign settlements and power, and gave himself up to luxury and sensuality. His brother-in-law Dion, whom he had banished, landed in Sicily in 357 with a band of exiles and dethroned him. Dionysius went to Locri, which he held till 346, when he recovered Syracuse; but in 343 was again driven out by Timoleon, and retired to Corinth. DIONYSIUS EXIGUUS, monk of the sixth century, and abbot at Rome, was the reputed founder of the Christian era as now established. Before him it had been calculated from the death of Christ; he first fixed the year of the incarnation in the 754th year of Rome, and after the eighth century this was universally adopted as the commencement of the era. He also made the first regular collection of ecclesiastical laws in the W. Church.

Diophan'tus, Greek mathematician; lived at Alexandria, probably in the period between 200 and 400 A.D.; author of the most ancient extant treatise on algebra, and the reputed inventor of algebra, according to Lagrange and others. He wrote an important work called "Arithmetica" in thirteen books, of which only six are extant.

Diop'trics, that branch of geometrical optics which treats of the refraction of light, or of the changes which take place in the direction of rays transmitted from one medium to another (as from air to water, etc.), or through media of varying density. It is applied chiefly in the construction of telescopes, microscopes, and other instruments requiring the use of refracting lenses.

Dioptric Sys'tem, arrangement of lenses for condensing light in lighthouses; devised by Fresnel abt. 1819, and based on the discoveries of Buffon, Condorcet, Brewster, and others. See REFRACTION.

Diora'ma, mode of scenic display invented by Daguerre and Bouton, and first exhibited in Paris, 1822. The painting is viewed through a large aperture or proscenium, beyond which it is placed at such a distance that the light is thrown on it at a proper angle from the roof, which is glazed with ground glass and cannot be seen by the spectator, who is in comparative darkness, receiving no other light than what is reflected from the painting itself.

Di'orite, rock belonging to an important group of granular and massive green stones, which in appearance and structure resemble granite, but which in composition differ materially from this rock type. Diorite is composed essentially of the two minerals, hornblende and triclinic feldspar (oligoclase, andesine or labradorite). In general appearance and mode of occurrence diorite is so like granite that it is, as a rule, popularly known by this name. It is available for all the uses to which granite is applied.

Dioscor'ides Peda'nius, Greek botanist; b. Anazarba, Cilicia; lived in the period between 50 and 200 A.D.; traveled in Asia Minor, Greece, and Italy to procure information about plants, and wrote in Greek a celebrated work on *materia medica,* in which he describes or names more than 500 plants. This work was regarded as the highest authority for fifteen centuries or more, and was universally used by medical and botanical students.

Dioscu'ri, name given to Castor and Pollux (*q.v.*).

Dip, in geology, the angle of inclination of a stratum to the horizon. Where the country is level an inclined stratum cuts the surface in a straight line, and the direction of this line is called the strike of the stratum. The direction of the dip is at right angles to the strike. The belt through which a stratum is exposed at the surface is called its outcrop. In a level country the outcrop has the same direction as the strike; in a hilly or mountainous country it may have a very different direction.

Diphtheria (dĭf-thē'rĭ-ă), or **Mem'branous Croup,** acute infectious disease commonly attacking the throat. Its usual victims are children, though it is often fatal to doctors and nurses. It is caused by an invasion of the Klebs-Loeffler bacillus, whose ravages cover the throat with a membrane consisting of necrosed or dead tissue, in which the bacilli thrive. This may cause suffocation, while the poison generated by these bacteria produces great prostration. In the first stages it is hard to distinguish diphtheria from other forms of sore throat, such as tonsilitis. A swab of cotton may, however, be rubbed over the inflamed parts, and if a culture of the bacillus can be made therefrom it is proof that the infection is diphtheria. Facilities for making such tests are provided for physicians by the public-health offices of most large cities.

The attack begins with fever which, in severe cases, may rise to 104° in twenty-four hours. There is pain in the back and limbs, and perhaps convulsions. The degrees of susceptibility to diphtheria vary greatly: there may be few symptoms and quick recovery, or the patient may die in two or three days, overwhelmed by the intensity of the bacterial poisons.

Every suspected case of diphtheria should be isolated, and all who have come in contact with it kept in quarantine. The patient should have liquid food and plenty of water. The treatment includes applications of disinfecting solutions to the throat to kill the bacteria, and keeping the air the patient breathes well ventilated and moist. The administration of the antitoxin (see ANTITOXIN) is one of the greatest triumphs of modern medicine, as the proportion of deaths, which formerly stood 38 per cent, has been reduced to 9.8 per cent in those cases treated with the serum. Suspected cases,

or those exposed to diphtheria, may be rendered immune by a light injection of antitoxin.

Diph'thong, the union of two vowels pronounced together in one syllable, *i.e.*, with one push or impulse of voice; thus *ou* in *loud*, *oi* in *soil*. An improper diphthong is one which is such only in orthography, as *ea* in *beat*. A genuine diphthong may, on the other hand, be represented by a single vowel sign, as *i* in *five* (pronounce *faiv*).

Diplo'macy, art of conducting the official intercourse between foreign states; it is generally managed by ambassadors instructed in the policy to be pursued, or by the ministers of foreign affairs. The negotiation of treaties forms a part of the duties of these envoys, but frequently they exercise a delicate and yet profound influence over the nation with which they are sent to deal. In giving instructions, much must sometimes be left to the discretion of the diplomatist. Very early in history heralds and ambassadors bore messages from one power to another. These messages were usually special. It is only in modern times that diplomatists are established permanently in foreign courts to watch the interests of their own governments. From the very necessities of the case ambassadors have been held personally sacred, since, were it not so, it would be impossible for them to venture into unfriendly states. Even among barbarians their privileges were respected. When resident ambassadors first came to be employed they were looked on as spies, but as the usage became general its advantages were made manifest. It tends to bring nations nearer together, and to make them respect one another; when there are representatives of foreign states in each country, the community of nations is more vividly felt. Ambassadors become acquainted with the laws, institutions, and history of the land where they reside; they protect their countrymen who are there as travelers or residents; they foresee difficulties, and are able to prevent them; they put their countries on their guard against the preparations for war of other states; and when they withdraw on account of war, their absence causes the separation of the two countries to make more impression.

Diplomat'ic A'gents, representatives accredited by a sovereign or government to other sovereigns or governments. Every party to international law is a treaty-making power, and every such power must act by some representative. No inferior community is entitled to send representatives abroad who have international rights. Egypt, for instance, does not enjoy the right of embassy, being under the suzerainty of the Porte. A province, a colony, or a city may have agents in foreign lands, but such persons have none of the rights of ambassadors. This term "ambassador" may be used generally to include various grades or kinds of diplomatic ministers, and it is often used also to denote one, and generally the highest, class of such ministers. Other words are *legate* and *nuncio*, usually denoting representatives of the pope; *chargé d'affaires*, a term for a lower grade of ambassadors; envoy and plenipotentiary, which latter term generally means less than its derivation implies. There are again ambassadors sent for a particular object, and others whose functions relate to all the political transactions of one nation with another; there are temporary and resident ambassadors; there are also persons who discharge the office without taking the name. As for the relative rank of diplomatic agents, the rules laid down by the plenipotentiaries of the eight leading powers concerned in the Congress of Vienna (1815) are generally followed, together with the supplementary rule adopted at Aix-la-Chapelle in 1818. The ranks are (1) ambassadors, legates, or nuncios; (2) envoys, ministers, or others accredited to sovereigns; (3) resident ministers; (4) *chargés d'affairs* accredited to ministers of foreign affairs or secretaries of state.

Diplomat'ics, science of the knowledge of ancient documents, and especially of their age and authenticity. The charters of grants from sovereigns to individuals and corporations were formerly called diplomas, and the word is applied to all public documents of the Middle Ages and later centuries.

Dip of the Hori'zon, apparent depression of the sea horizon, or line between ocean and sky, below a horizontal line going out from the eye of the observer. It arises from the rotundity of the earth. It varies with the state of the air, but its amount, in minutes of arc, is nearly equal to the square root of the number of feet the eye of the observer is above the ocean.

Dip'per, popular name of birds of the genus *Cinclus* and family *Cinclidæ* which contains the ouzels, found in Europe, Asia, and America. They feed chiefly on mollusks and on aquatic insects and their larvæ, which they seek in clear lakes and streams, diving readily and moving about under water by means of their wings. The dippers build very curious nests of interwoven moss, having the entrance in one side. The term is applied on the New England coast to small ducks and diving fowl.

Dipper. See GREBE.

Dipper, The. See URSA MAJOR.

Dip'ping Nee'dle, an instrument showing the magnetic dip. When a magnetic needle is hung within a stirrup so as to move freely in a vertical direction, and the whole system is suspended by a thread, it will adjust itself in the magnetic meridian, and its pole will dip toward the N. pole of the earth. Such a needle is called a *dipping needle*, and its deviation from the horizontal line is its *inclination*. When the needle is carried nearer the magnetic pole the inclination increases. Approaching the equator, it becomes less and less inclined, until a point is reached at which it is horizontal. This point will be in the *magnetic equator*, or line of no dip, which is near, but not coincident with, the equator of the earth. The inclination, like the declination, is subject to periodic and secular variations. Since 1671 it has steadily diminished at the rate of three to five minutes a year.

Dip'tera, order of insects which includes the flies. They are the most differentiated (high-

est) of all insects, and are characterized by having the various mouth parts so modified into a piercing and sucking organ that the different elements can only with difficulty be traced. The eyes are very large; the front wings alone are of use in flight, the second pair are reduced to short clubbed "halteres" or "balancers," so called because without them the fly cannot direct its flight. In their development the flies undergo a "complete metamorphosis." The larvæ, known as maggots, are usually footless, and some have lost the sense organs and biting mouth parts. In some the pupa is inclosed in a hardened pupa case; in others (*e.g.*, the mosquito) the pupa is free and capable of motion. The Diptera are divided into two suborders: (1) *Brachycera* with short antennæ. Here belong the common house flies, blowflies, bat flies, and the like, as well as certain forms which, like the sheep louse, have so degenerated by parasitism that they have lost the wings. (2) *Nemacera* with long, often feathered, antennæ, containing the midges, the mosquitoes, gall flies, Hessian flies, and the like. The fleas (Aphaniptera,) are sometimes placed here. See ENTOMOLOGY; FLY.

Diptych (dĭp'tĭk), tablet anciently used as a notebook, originally two united by a hinge, and afterwards more. The tablets were of ivory, wood, slate, papyrus, or metal—sometimes gold or silver. The external faces were



ILLUSTRATED DIPTYCH.

ornamented; the interiors were smooth, so as to receive a coating of wax, or to admit leaves of parchment or papyrus. In liturgical usage the diptychs were public lists or tables, which contained the names of those in communion with a particular church, of saints and martyrs, etc. To have the name of a person erased from the diptychs was equivalent to excommunicating him.

Dirce (dûr'sē), in Greek mythology, daughter of Helios and wife of Lycus, King of Thebes, who had repudiated Antiope, his first wife. Dirce, jealous of the latter, had put her in chains, but Zeus aided her to escape to Mount Cithæron, where she gave birth to two sons by him, Amphion and Zethus. These two slew Lycus, and tied Dirce to the horns of a bull, by which she was dragged about till dead.

Direct'ory, executive body of the French republic established by the constitution of 1795; consisted of five persons called directors, selected by the Council of Elders from a list of candidates presented by the Council of Five Hundred. The French armies gained many victories under this *régime*, but the home policy of the Directory was unpopular. The body was divided into two parties, and the majority, of whom Barras was one, removed their adversaries by the *coup d'état* of the eighteenth Fructidor, September 4, 1797. The growing popularity of Napoleon, dissensions in the government and the disastrous defeats in Italy, led to the overthrow of the Directory by the *coup d'état* of the eighteenth Brumaire, November 9, 1799, in which Napoleon, his brother Lucien, and Sieyès, were the chief actors.

Direct'rix, plural **Direct'rices**, a line which serves for the description of a curve or surface. The directrix of a conic is a right line perpendicular to the axis, whose distance from any point on the curve bears a constant ratio to the distance of the same point from the focus. Quadric surfaces have also directrices possessing analogous properties.

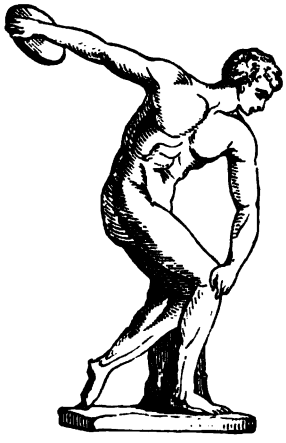
Disabil'ity, in law, the quality or state of being incapable of enjoying certain legal benefits or of doing a legal act; also, the fact or circumstance which makes a person so incapable. The disability is either absolute, as in the case of outlawry or attainder, or partial, as in minor children and married women. It may arise from the act of God, of the law, of the person himself, or of his ancestor.

Disci'ples of Christ, religious body often, in the S. and W. U. S., called the "Christian Church," or "Church of Christ"; sometimes "Campbellites." It originated in a movement which began in W. Pennsylvania in 1809, led by Thomas Campbell, a Scotch-Irish Presbyterian minister, and his son Alexander. The first congregation was organized at Brush Run, 1811. The society afterwards becoming convinced that immersion was the only scriptural form of baptism, was received into the Redstone Baptist Association, but soon discontinued the relation. Later "baptism for the remission of sins," or the doctrine that it was the divine plan to impart through baptism an assurance of pardon, became a distinguishing feature of the reformation urged by the Disciples. Another characteristic is the weekly communion, after the example of the primitive church. The Disciples do not differ essentially from the other evangelical denominations in their theological views. Their polity is congregational. They are actively engaged in home and foreign missionary work. In 1908 they had 11,307 churches and 1,285,123 communicants.

Dis'co, large island in Davis Strait off the W. coast of Greenland; belongs to Denmark; is mountainous in character; and has valuable coal mines. On the S. coast is the harbor of Godhaven, the seat of government in Danish Greenland.

Discob'olus, quoit thrower; an ancient statue representing a man either holding a circular

quoit, but at rest, like one in the Vatican, or in the very act of hurling the quoit, like Myron's statue, of which a copy exists in the Vatican, one in the British Museum, and one in the Palace Lancellotti at Rome.



DISCOBOLUS.

Dis'count, allowance or deduction made for cash or advanced payments. Thus if a seller allows a discount of fifteen per cent for the prompt or advanced payment of a bill amounting to $250, the purchaser may pay it with $212.50 ($250 less fifteen per cent). Discount is also the amount deducted from the face value of a promissory note, bill of exchange, or the like, in purchasing the privilege of collecting it at maturity. *Bank discount*, the form recognized in business and law, is simple interest paid in advance, and reckoned on the amount of the paper instead of on the amount advanced. *True discount* is such a deduction as to be the interest on the amount advanced. At bank discount a note or bill for $100 due in twelve months, if discounted at six per cent, would bring $94. At true discount the same paper would bring $94.34 (computed by dividing $100, the face value, by $1.06, or $1 + the rate).

Dis'cus, Throw'ing the, athletic feat which in ancient Greece was one of the five tests (pentathlum) of the perfect athlete. The discus is a round plate of stone or metal, and in ancient times it was about 12 in. in diameter. The one now used weighs 4 lbs. 7 ozs., and is cast from a space 9 ft. square.

Diseas'es, Germ The'ory of. See BACTERIA: GERM THEORY.

Disfran'chisement, act of depriving a person of any privilege, liberty, franchise, or immunity, such as depriving a member of a corporation of his corporate rights. It is distinguished in this case from "amotion," which refers to the removal of an officer of the corporation from office, without affecting his membership. Another instance is the act of depriving a person of the rights and privileges of citizenship. This term is often applied to the act of depriving a person of the right to vote, and in Great Britain to the act which deprives a constituency of the right to return a member to Parliament. See FRANCHISE.

Disinfec'tion, the destruction of the causes of infectious and contagious diseases. The causes of all infectious and contagious diseases in man and the lower animals are minute organisms, and in most of them—as anthrax, tuberculosis, glanders, erysipelas, suppuration, diphtheria, typhoid, tetanus, etc.—these organisms have been isolated, and shown to be bacteria. Disinfection is accomplished by both thermal and chemical means. Thermal disinfection includes destruction of infection by hot air and steam, also by fumigation, which is the application of smoke gases or vapors with germicide properties. Chemical disinfection implies the destruction of infective particles by substances that break them up, forming other compounds. In either case the vitality of the infective agents is destroyed, through alterations in the protoplasm, or primary matter, composing them, by the agent employed. In some cases this involves the decomposition and disintegration of the infective particles, in others they may be simply killed and not otherwise altered.

Sterilization is the killing of all living things, including spores and vegetative forms of microörganisms, that may be present in a substance or inclosed space, or on a given surface. For the sterilization of instruments used in surgical operations it is customary to expose them to steam in an autoclave. An antiseptic is a substance which hinders or prevents the growth of microörganisms, and is directed especially against those forms of bacteria which cause pathological changes. The most certain and valuable disinfectant is heat, which may be applied by flame to effect complete destruction by burning, by baking in dry hot air, by steam under slight pressure, and by boiling water. The liquids most useful for disinfecting purposes are common whitewash made with freshly slacked lime, four-per-cent solutions of fresh chloride of lime, five-per-cent solutions of carbolic acid, and solutions of corrosive sublimate 1–1,000. See ANTISEPTICS; FUMIGATION.

Disk, or **Disc,** in astronomy, the face of the sun, moon, or a planet, such as it appears to us projected on the sky. The forms of the celestial bodies being nearly spherical, their projections are circular planes. The fixed stars, when viewed through a telescope, present spurious disks, in consequence of the diffraction of light.

Disloca'tion, or **Luxa'tion,** the displacement of a bone from its proper relation to another bone with which it is articulated. A complicated dislocation is the displacement of a bone, accompanied by a severe local lesion of the soft parts, or fracture of a bone. Congenital dislocations are those which occur before birth. The restitution of a dislocated bone is called its reduction. Reduction of recent luxations is usually a comparatively easy task to those who have the requisite knowledge and experience, but in old and long-neglected cases it is frequently a most formidable operation, and is liable to be followed by bad consequences to the patient.

Dis'mal Swamp, great morass in Virginia and N. Carolina, occupying the E. part of the peninsula between Chesapeake Bay and Albemarle Sound; was originally about 35 m. long and 25 m. wide, but has been diminished by

the drainage of its margin and of portions of the interior. A large portion of it is covered with dense forests of juniper, cypress, white cedar, and black gum trees, the lumber of which is exported, while other parts are densely covered with reeds. W. of the middle of the swamp is Lake Drummond, the scene of Thomas Moore's "Lake of the Dismal Swamp," which has an area of about 6 sq. m., and abounds with fish. A canal through the swamp opens steam communication between Chesapeake Bay and Albemarle Sound, and a railway runs through the E. portion.

Dispen'sary, charitable institution in which medical and surgical aid is furnished to the poor either gratuitously or for a small fee to cover the cost of medicine and dressings. During the Middle Ages, dispensaries were set up in the houses of the wealthy and in monasteries, but toward the end of the eighteenth century they were established about in their present form. The oldest in the U. S. was founded in New York, 1795. Though too often untilized by persons well able to pay a physician, they are a great boon to the poor, and the clinical material they afford is the best possible help to practical knowledge for the students who are permitted to watch the examinations and treatment.

Dispensary Sys'tem. See LIQUOR LAWS.

Dispensa'tion, in the Roman Catholic Church, exemption from some canon or other law. Bishops and priests grant dispensations in some cases, but the pope alone has the power in the more important ones. After the English Reformation the dispensing power was assumed by the kings, but it was abolished by the Bill of Rights, 1689.

Disper'sion, in optics, the angular separation of the constituent rays of light when decomposed by the prism. Owing to the unequal refrangibility of the rays of different colors, a beam of light admitted through a small aperture in the shutter of a darkened room, and refracted by passing through a prism, forms an elongated image or spectrum; the red rays, which are the least refracted, occupying one end of the spectrum, and the violet rays, which have the greatest refraction, the other end. The rays after refraction are no longer parallel, so that the index of refraction (the ratio of the sine of the angle of incidence to the sine of the angle of refraction) is different for each ray; and the difference of the indices for the extreme rays, at the two ends, is called the dispersion of the light. The amount of dispersion varies with the angle of the prism and the material of which it is composed.

Disraeli (dĭs-rā'lē), **Benjamin** (Earl of Beaconsfield), 1804–81; English statesman and novelist; b. London; son of Isaac Disraeli; grandson of a Hebrew merchant originally from Venice; entered Parliament for Maidstone, 1837; became, abt. 1842, the leader of the "Young England" Party, and a Tory opponent of Sir Robert Peel; returned in 1846 for Buckinghamshire, which he represented for many years; leader of the Protectionist Party in the House of Commons, 1848; Chancellor of the Exchequer, 1852, 1858–59, resigning because a bill for parliamentary reform introduced by him had been rejected; served again, 1866–68; leader of the House of Commons. He was the principal author and manager of the Reform Bill of 1867, which enfranchised nearly 1,000,000 men, mostly working men; became Prime Minister, 1868, succeeding Lord Derby; Lord Rector of Glasgow Univ., 1873; Earl of Beaconsfield, 1876; plenipotentiary at the Congress of Berlin, 1878; Prime Minister, 1874–80. Among the characteristic measures of his ministry were the creation of the title "Empress of India," the establishment of the "scientific frontier" between Afghanistan and the Russian possessions in central Asia, the acquisition of Cyprus, and the subjugation of the Zulus. His principal novels are "Vivian Grey," 1826; "The Young Duke," 1830; "Contarini Fleming," 1832; "Henrietta Temple," 1836; "Coningsby," 1844; "Lothair," 1870; and "Endymion," 1880; some of them were successful, not so much by literary merit as on account of their close reference to actual circumstances.

Disraeli, Isaac, 1766–1848; English author; father of Benjamin Disraeli; b. Enfield. Inheriting a fortune from his father, he devoted himself to the study of literary history; principal works "Curiosities of Literature," "Calamities of Authors," "Quarrels of Authors," and "Amenities of Literature."

Dissent'ers, English Protestants who differ in their views from the Church of England. The General Body of Protestant Dissenting Ministers of the Three Denominations is the official name of the union of the three boards of the Presbyterian, Independent, and Baptist ministers resident in and about the cities of London and Westminster. This union was organized, 1727, and has always taken a leading part in the struggle for the disestablishment of the Church of England. In some European countries Dissenters are called Dissidents. See NONCONFORMISTS; SEPARATISTS.

Dissocia'tion, in chemistry, the resolution of complex molecules into simpler ones, or it may be into atoms; when this is done by heat the process is also called thermolysis; when by electricity, electrolysis.

Dissolv'ing Views, enlarged images of transparent pictures thrown upon a screen by means of two magic lanterns placed side by side, with their lens tubes a little convergent, so that the projected images may be superposed. By means of mechanical contrivances one of the images is gradually extinguished while the other is similarly developed. At the middle point the two are confusedly intermingled, and afterwards one seems to swallow up the other. See CHRONOPHOTOGRAPHY.

Dis'taff, one of the earliest and most simple implements used in spinning, consisting of a stick with a cleft or pronged end, around which the fiber to be spun was wound. The distaff was usually held under the left arm, a spindle was attached to the end of the thread

and set rotating, and the thread as it was drawn out rapidly by the right hand wound itself around the spindle. When the small wheel used for spinning flax was invented the distaff was attached to it. See SPINNING.

Dis'tance, word of various applications. In astronomy, real distance is an interval between two heavenly bodies expressed in terrestrial measures, as miles, meters, etc.; mean distance is a mean between two real distances, as between the perihelion and the aphelion of a planet, *i.e.*, between its least and its greatest distance from the sun. Curtate distance of a planet is the distance from the sun or earth to that point where a perpendicular let fall from the planet meets the ecliptic. Line of distance in perspective is a straight line from the eye to the principal point of the plane. The point of distance is that point in the horizontal line which is at the same distance from the principal point as the eye is from the same.

Distance in music is the interval between two notes. Distance in navigation is the number of miles from point to point in a ship's course. The arc of a rhumb line between two places is the nautical distance. Distance in horse racing is the last 250 yds. of the course. Any horse not reaching the distance post before the winning horse has reached the end of the course is said to be distanced.

Distem'per, method of painting in which the pigments are ground up with size and water, white of egg with gum water, or similar vehicles. It is employed in scene painting and in the preparation of wall paper.

Distich (dĭs'tĭk), couplet of verses; in Greek and Latin a hexameter followed by a pentameter verse. It was much used in the expression of single thoughts and sentiments, and in the composition of epigrams.

Distilla'tion, process by which substances that vaporize at different temperatures are separated from each other, or substances which can be vaporized are separated from those which cannot. When the vaporized substance



SIMPLE DISTILLING APPARATUS.

assumes a solid form after distillation, the process is called "sublimation." Distillation is usually performed by a boiler for raising the vapor, and a condenser for reducing the vapor to a liquid or solid form. The condenser is often a spiral tube or "worm," kept cool by water.

Distress', or Distraint', in English law, taking a personal chattel without process of law out of the possession of a wrongdoer, by way of pledge for redress of an injury or for the performance of a duty, as for nonpayment of rent or taxes, etc.

Distribu'tion. See POLITICAL ECONOMY.

Dis'trict, territorial division; a defined portion of a state or city, which is divided into districts for judicial, fiscal, or elective purposes. The U. S. are divided by the Federal Govt. into judicial districts, for each of which there is created a district court. Each state having a sufficient population is divided into congressional districts, which are nearly equal in population, and elect each one member of Congress. By the census of 1900, the population of a "district" is to be 193,284. The ratio is raised after each census, in order that the number of members in Congress may not become inconveniently large. Each state is, by the Constitution, entitled to at least one representative, though its population may not equal the prescribed number for a district. Nevada, with less than 50,000 inhabitants, has one representative, and Delaware, with less than 190,000, also has one. But each of these states has two Senators. Every state is also divided into senatorial districts, each of which sends a member to the Senate of that state. There are also tax districts, land districts, etc. Townships in many parts of the U. S. are divided into school districts, each of which maintains and manages one or more public schools.

District of Colum'bia, Federal district or territory of the U. S.; since 1800 the seat of the national government; bounded N., NW., E., and SE. by Maryland and W. and SW. by the Potomac River and Virginia; area, 70 sq. m. Originally its area was 100 sq. m., consisting of a tract lying on both sides of the Potomac, 10 m. square, ceded to the U. S. by Maryland and Virginia, 1788–89. The Virginia portion, with the city of Alexandria, was retroceded by Congress, July 9, 1846. A territorial government was created by Congress for the district, 1871, repealing the charters of the cities of Washington and Georgetown, and merging them into the same government. This was abolished, 1874, and the affairs of the district are now managed by three commissioners under the direct legislation of Congress for the levying and disbursements of taxes and for all public improvements. The citizens have no vote, either in district or national affairs. Justice is administered by a Supreme Court of the District of Columbia, a Court of Appeals, and by a police court.

Ditch, or Fosse, deep trench or excavation around a fort, serving as an obstacle to the enemy in combination with the parapet or rampart. It is generally dry, but is sometimes filled with water. In permanent works, such as the regular fortifications of a town, the rampart and ditch are the most important; the former being beside the latter, and formed of earth excavated from it.

Dith'yramb, lyric poem sung in honor of Bacchus; invented by Arion, in Corinth, abt. 620 B.C., according to Herodotus; was of a lofty but often inflated style; hence the term

dithyramb is frequently applied to any lyric of a boisterous character, such as might be composed in a state of intoxication.

Dit'marschen, or, in Scandinavian, DITMARSKEN, district of W. Holstein stretching along the North Sea from the mouth of the Elbe to the mouth of the Eider, and comprising an area of about 500 sq. m.; its original name was *Thiatmaresguho* — that is, "Dietmar's Gau." At present it forms no independent community; it is merely a portion of the Prussian province of Holstein.

Dit'ton, Humphrey, 1675–1715; English mathematician; b. Salisbury; minister of a Dissenting church at Tunbridge; befriended by Sir Isaac Newton, who procured his appointment as mathematical master of Christ's Hospital; wrote able works entitled "Laws of Nature and Motion," "Treatise on Fluxions," and "Synopsis Algebraica."

Diu (dē'ô), island of India, in the Arabian Sea, near the coast of Guzerat; has a fortified seaport, Diu, with a tolerably safe harbor and the remains of a famous Hindu temple; has been possessed by the Portuguese since 1515; area, 62 sq. m. Pop. (1894) 13,206.

Divan', word common to several Oriental languages; is employed by the Persians to denote a collection of poems by one author, the divan of Saadi or the divan of Hafiz. The term is also applied to a muster roll or military day book. The Turkish divan is the great council of the empire or supreme judicial tribunal. The word *divan* is also among the Turks a common appellation for a salon or hall which serves for the reception of company, and along the sides of which are arranged low cushioned seats or sofas.

Div'er, any bird of the genus *Colymbus* and family *Colymbidæ*. The bill is straight, strong, and pointed, tail and wings short, and the toes webbed. They dive with great facility, and pursue under water the fish on which they live. The principal species are the loon or great N. diver, the black-throated diver, and the red-throated diver. The name is also popularly applied to numerous aquatic birds, such as the grebes and auks.

Divertissement (dē-vār-tēs-mäṅ'), musical composition arranged for one or more instruments; has generally no fixed character, and may be classed between the *étude* and the *capriccioso*. The term is also applied to a ballad, or songs introduced between the acts of an opera.

Divid'ers, instruments for dividing or marking off distances, or for drawing circles, ellipses, and other curves. They consist of two, sometimes three, bars or legs, joined at one end by a hinge. Sometimes two movable points are arranged to slide along a "beam" or straight bar. "Proportional dividers" are made of bars crossing each other and pointed at both ends. By means of a sliding joint at the point of union, dimensions included between one pair of points may be made greater or less than those included between the other pair at the same time in any proportion.

Divid'ing En'gine, machine for marking the divisions of scales of measurement in scientific, mathematical, and astronomical instruments. The dividing engine depends primarily for its accuracy upon the degree of precision attainable in the cutting of a steel screw. The most remarkable screws as yet constructed are probably those in two dividing engines designed by Professor Rowland. They are used in the ruling of diffraction gratings for optical work. Test plates for the microscope have been ruled by M. F. Nobert, of Barth, Pomerania, with divisions only $\frac{1}{110000}$ of a French inch apart.

Divina Commedia (dē-vē'nä kŏm-mä'dē-ä), or **Divine' Com'edy.** See DANTE.

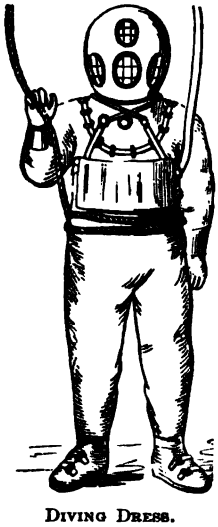
Divina'tion, art of foretelling events by superstitious experiments, etc., by observing the flight of birds, the planets, clouds, and also by the alleged influence of spirits. Among the Romans divination was practiced in various forms, and is supposed to have originated among the Etruscans. The Israelites were forbidden by the law of Moses from performing divination. Among the Greeks divination was extensively practiced, and it flourished in Chaldea and Egypt. It was not confined to ancient races, however, nor to the East, for throughout the Middle Ages various arts of divination were commonly practiced in Europe. See ASTROLOGY; AUGUR; HOROSCOPE.

Divine' Right of Kings, doctrine, probably of very ancient origin, that a monarch was the immediate representative of Deity, by whom alone he could be held responsible. It would appear that the idea was gradually developed out of the principle of authority that prevailed in the Roman Catholic Church, and we find the divine authority of the civil magistrate asserted throughout the Middle Ages. In the great papal-imperial struggle the divine nature of the emperor's authority was maintained by Ghibelline writers, and Dante's "De Monarchia" reveals the dream of a new world emperor ruling by the grace of God, but the idea was not systematically advocated till the time of the Stuarts in England. The most complete exposition of the theory is to be found in Sir Robert Filmer's "Patriarcha." Hobbes and other prominent writers supported it; among its opponents were Milton and Algernon Sidney.

Div'ing Bell, a hollow, bell-shaped chamber, open at the bottom, used by divers to descend into deep water for various works or explorations. A kind of kettle is said to have been used by divers in the time of Aristotle. John Taisnier (b. 1509) makes the earliest mention of the practical use of the diving bell in Europe. In 1665 it was used to raise portions of the Spanish Armada. Dr. Halley's plan for supplying fresh air was introduced abt. 1715. His diving bell consisted of a wooden chamber open at the bottom, where it was loaded with lead to keep it perpendicular in its descent. Light was admitted through glass set in the upper part. Air was supplied by a hose attached to casks filled with air and weighted with lead, which were let down lower than the bell. In 1779 Smeaton first applied the diving

bell to engineering, and in 1788 he used a force pump to supply it with air. He made a diving bell of cast iron, shaped like a square chest, its greatest thickness being at the lower part, that it might not overturn. For most work beneath the water a submarine armor or diving dress is employed.

Diving Dress, waterproof dress worn by divers, enabling them to walk and work under water. An aquatic armor, consisting of a leather dress and a helmet, is described in Schott's "Technica Curiosa," published in 1664. An India-rubber cloth diving dress was invented later, with a metal helmet having a plate-glass front. Attached to the helmet are two tubes—one to admit fresh air, the other to carry off the waste air. Leaden weights are attached to the diver, enabling him to descend and walk about. Communication can be carried on with those above by means of a cord running between the diver and the attendants, and telephones have been adapted in the diver's helmet. The diving dresses in use at present can make the diver independent of any connection with persons above the water. They are elastic and hermetically closed. The diver carries upon his back a reservoir containing air compressed to 30 or 40 atmospheres, which is supplied to him for breathing by a self-regulating apparatus at a pressure corresponding to his depth. When he wishes to ascend he simply inflates his dress from this reservoir. A depth of 200 ft. has been reached by straight divers for pearls and sponges, who simply touch the bottom and come up with what they have grabbed; but the record working depth is 135 ft., and the man who stayed at this depth died soon afterwards, paralyzed by the pressure.



DIVING DRESS.

Divin'ing Rod, forked branch of wood, sometimes artificially made, or a metallic rod similarly shaped; by which, according to the belief of the vulgar, water or minerals hidden under ground may be discovered. The operator grasps a prong in each hand, holding the rod before him as he walks, and when the exact spot is reached the rod twists suddenly, pointing to it. The superstition is one of very great antiquity. In Europe the rod used for finding water is usually a branch of the rowan tree; in the U. S. it is generally cut from the wych-hazel, or from a fruit tree.

Divi'sion of La'bor, in political economy, the plan by which a mechanic or laborer, instead of finishing the whole of any piece of work, is kept employed upon one special department of that work. Many persons are in some trades employed in turning out a piece of work which would formerly have been finished by one man. The first result of the division of labor is the great increase of production, for ten men, each employed upon a special branch of work, will turn out more and much better work than the same ten men would do if each began and finished an entire piece of mechanism. It is objected, on the other hand, that the division of labor tends to diminish the versatility and excellence of individual workmen, and the force of this objection is felt in times of industrial depression, when highly specialized labor cannot readily flow into other channels. Division of labor is extending with the advance of civilization. Even the learned professions are influenced by it. Lawyers more and more devote themselves to particular departments of their professional work. Medicine is becoming divided into specialties. No one man is equally expert in every branch of a great science like chemistry, some giving their attention, for example, to organic chemistry, some to toxicology, others to analysis, etc. The general result will undoubtedly be beneficial to society. See FACTORY.

Divorce', dissolution of a marriage by a court of law, or by a legislative or parliamentary act. In heathen nations divorces have generally taken place at the will of the parties concerned, and even the ancient Romans, during the later period of the republic and under the emperors, allowed the greatest license in this respect. Divorce existed to some extent among the Greeks, more especially at Athens. Easy divorce, which had prevailed among the Hebrews, was restrained and discouraged, though not done away with, by the laws of Moses. Among Christian nations marriage is for the most part looked upon as possessing at once a religious and a civil importance. The Roman Catholic Church denies the possibility of divorce, although there are cases in which, according to the canon law, the union is declared to have been illegal from the first, and in reality never to have existed at all. In the U. S. matrimonial jurisdiction is established by statutes in the different states, enumerating the causes of divorce, which are by no means uniform. The power to grant divorces is in general exercised by courts having equity jurisdiction. See MARRIAGE; SEPARATION.

Dix, Dorothea Lynde, 1805–87; American philanthropist; b. Worcester, Mass.; devoted much time to the work of ameliorating the condition and treatment of prisoners, lunatics, and paupers, and efficiently promoted the establishment of asylums for lunatics in many states. During the Civil War she rendered invaluable service in the hospitals near Washington. Besides children's books, tracts, etc., she published "Prisons and Prison Discipline."

Dix, John Adams, 1798–1879; American statesman and military officer; b. Boscawen, N. H.; removed to Cooperstown, N. Y.; U. S. Senator from New York, 1845–49; Free-soil candidate for governor, 1848; Secretary of the Treasury, 1861, and as such issued the famous

order: "If anyone attempts to haul down the American flag, shoot him on the spot;" served in the Civil War, and as commander of an army corps, 1863, cut Gen. Lee's communications; minister to France, 1867–68; Governor of New York, 1873–75.

Dix'ie, or Dixie Land, popular term for the S. U. S.; said to have been first used when Texas was admitted to the Union, and to have been derived from a New York slave owner, Dixie, who, as abolition sentiment grew stronger in the early nineteenth century, moved his slaves S. The slaves celebrated their old N. home as Dixie's Land, and this name was later transferred to the South. Dixie is the title of several popular ballads, including (1) a Confederate battle song by D. D. Emmett, 1859; (2) another by Albert Pike, 1861; (3) a N. song by T. M. Cooley.

Dix'on En'trance, strait on the W. coast of N. America, 100 m. long; separates Queen Charlotte Island from Prince of Wales Archipelago.

Djez'zar, or Jez'zar ("the butcher"), surname of ACHMED PASHA, 1735–1804; Turkish soldier and governor; b. Bosnia; left country to escape punishment for a crime, and after many hardships was sold as a slave at Cairo. He rose by boldness and duplicity to become Pasha of Acre. His violence to the French consul and residents at Acre was one of the ostensible grounds for Napoleon's invasion of Syria in 1799. Though alarmed by the victories of the French, Djezzar was induced by Sir Sidney Smith to attempt the defense of Acre. The result was a serious check to the French arms. A three months' siege, in the course of which several assaults were made, proved unavailing; a pestilence broke out among the besiegers, and the threatened attack of the English on Egypt caused their recall.

Dnieper (nē'pĕr), river of Russia; next to the Volga and Danube, the greatest and most important river of Europe; rises in the government of Smolensk, at the foot of the Valdai Hills, flows nearly S. to Kief, below which its direction is SE. to Ekaterinoslaf; from there it runs SW., and enters the Black Sea on the N. side; length, including windings, 1,330 m.; the greater part is navigable. From the mouth of the Berezina the Dnieper is the S. part of the ship-canal route from Riga on the Baltic to the Black Sea. Its principal tributaries are the Berezina, Pripet, Merca, Sozh, Borona, and Desna, all navigable.

Dniester (nēs'tĕr), river of Europe; rises in the Carpathian Mountains in Galicia, and flows SE. into Russia; it forms the boundary between Bessarabia and Podolia and Kherson; enters the Black Sea near Akerman, 30 m. S. of Odessa; total length, 760 m. Its navigation is difficult.

Doab', or Duab' (*i.e.*, "two waters"), in Hindustan, a tract between two rivers, especially that between the Ganges and the Jumna. This doab extends from Allahabad to the base of the Himalayas, 500 m. or more.

Dobell', Sydney, 1824–74; English poet; b. Cranbrook, Kent; works include "Balder," "England in Time of War," and "England's Day."

Döbereiner (dö'bĕr-ī-nĕr), **Johann Wolfgang,** 1780–1849; German chemist; b. near Hof, Bavaria; Prof. of Pharmacy and Chemistry at Jena from 1810 until his death; best known as the discoverer of the combustibility of platinum and of the so-called Döbereiner's lamp, which is ignited by directing a jet of hydrogen on a piece of platinum sponge.

Dobrudjà (dō-brō'jä), SE. portion of Roumania; separated from Moldavia and Wallachia by the Danube, and bounded E. by the Black Sea; it belonged to the Turks until 1878. Pop. 107,000, consists of Bulgarians, Cossacks, Tartars, Armenians, Turcomans, Greeks, and Jews.

Dob'son, Henry Austin, 1840– ; English author; b. Plymouth; works include the volumes of verse, "Vignettes in Rhyme," "Proverbs in Porcelain," "At the Sign of the Lyre," "Old World Idylls"; prose studies of "Thomas Bewick," "Oliver Goldsmith," "Horace Walpole," also "Eighteenth Century Vignettes," and "Sidewalk Studies."

Doce (dō'sā), river of SE. Brazil; rising in the Serra da Mantiqueira of Minas Geraes, and flowing with a general easterly course, through Espirito Santo, to the Atlantic; length from the junction of the rivulets Piranga and Gualacho, which are regarded as the sources, 462 m.; navigable for small steamers to Sousa, 138 m.

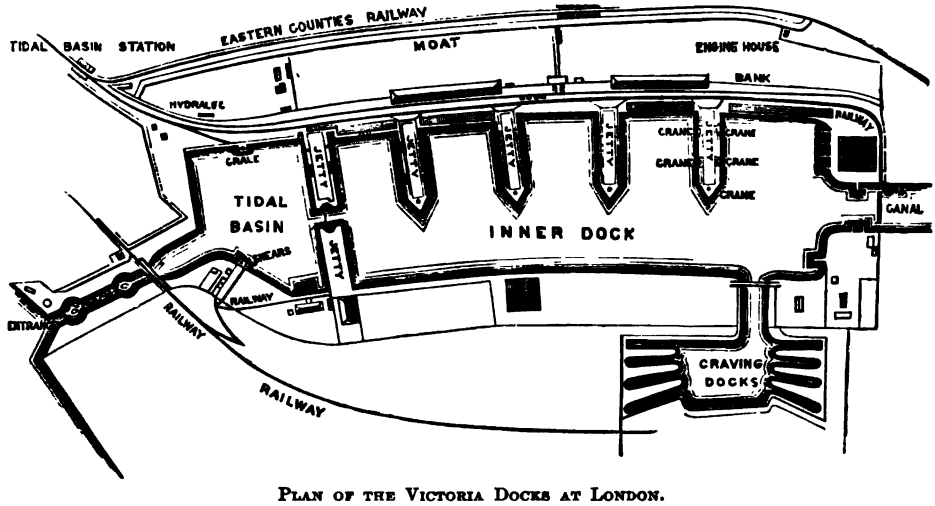
Docetæ (dō-sē'tē), sect which arose in the first century, practically denying the incarnation of God in Christ. Some affirmed the body of Christ to be a mere deceptive appearance, others only denied its fleshy character, but the object of both was to render the conceptions of Christ's life on earth less gross and material than the orthodox view seemed to them to present. Docetism was one of the earlier forms of gnosticism. See GNOSTICS.

Dock, perennial herbaceous plant of the family *Polygonaceæ* and genus *Rumex*, found chiefly in temperate climates; has large ovate or tapering leaves, and greenish flowers in panicles. In increases rapidly from the seed, and having long tap roots is a very troublesome weed. The roots of several species are valued in medicine for their astringent properties; they are also used in dyeing. The yellow dock is esteemed in the U. S. as an alterative.

Docks and Dock'yards. Artificial enclosures in connection with harbors or rivers and used for the reception of vessels are called docks. A wet dock is a large basin in which the water is kept at a certain level by walls, so as to be unaffected by tidal changes, in order to facilitate the loading and unloading of cargoes. A dry dock is for the repairing and examination of ships, the water, after the entrance of the vessel, being removed by pumps or other means. All first-class ports need dry docks for the examination and repair of those parts of a ship which are usually immersed in water. Dry

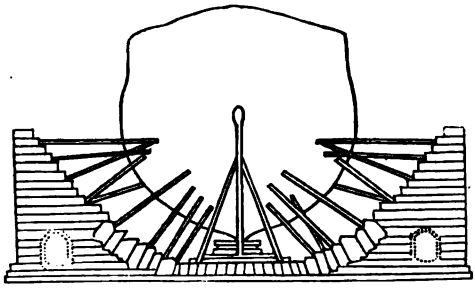
docks may be separated into two classes—the stationary dry dock, to which the name graving dock is generally applied, and the floating dock.

A graving dock is generally constructed of stone, though sometimes of timber. The sides



PLAN OF THE VICTORIA DOCKS AT LONDON.

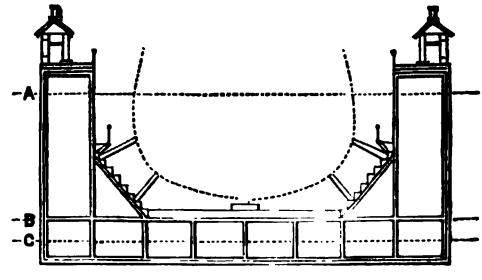
are in steps or altars, so that the form of the dock is somewhat similar to that of the vessel it is to contain, but sufficient space is left around it to enable the workmen to get at every part of the bottom of the vessel and



SECTION OF DRY DOCK AT BROOKLYN NAVY YARD.

to afford light for their work. The entrance is closed by gates, which open sideways, like a lock, or fall upon the bed of the entrance, or by caissons; the latter are almost universally adopted for large docks, and have the advantage of affording the means of retaining the water inside the dock as well as of keeping it out, which is of importance where the tide is ebbing rapidly, in allowing time to adjust the vessel before it settles down on the keel blocks. The vessel is floated into the dock at high water, the gates closed, the sluices opened, and the water allowed to run out with the ebb of the tide, or, where the fall of the tide will not permit, is pumped out, leaving the dock dry, the vessel being supported on timber struts and shores, which rest upon the steps already mentioned as forming the sides of the dock. Some of the larger graving docks can accommodate two ships at a time.

Of the floating dock there are several distinct varieties: The sectional dock, such as is in use in the Philadelphia and San Francisco navy yards; the Gilbert balance dock, in use in the Portsmouth, Va., and Pensacola, Fla., navy yards; the iron floating dock of the Bermuda dock pattern; G. B. Rennie's patent iron floating dock, of which the Cartagena dock is an example; and Edwin Clark's hydraulic lift dock, in use in the Victoria Docks, London. The most noteworthy floating dock in the world is the Dewey, built of steel, at a cost of $1,000,000, at Solomon's Island, Chesapeake Bay, and towed to Olongapo, Luzon, P. I., over 12,000 m. The finest and most costly docks in the world, both wet and graving, are at London, Liverpool, and Birkenhead. The greatest naval docks in the world are the Keyham docks at



END ELEVATION OF RENNIE'S DOCK. A. Level of water when ready to receive a ship. B. Level of water with ship docked. C. Level of water when light.

Devonport, England, built 1896–1907, and capable of permitting the largest battle ships to enter and leave with ease at any state of the tide. The U. S. has representatives of about every style, and several, such as the Atlantic

dock or basin in Brooklyn, N. Y. (begun 1841), the Erie wet docks near by, and the great stone graving dock at the Brooklyn Navy Yard (built 1841–51), were pioneers in their class.

Dockyards are yards or places for building, repairing, or fitting out ships; also for laying them up when not required for service. Those owned by the U. S. Govt. are called navy yards. They are located near a harbor or on a river through which the sea can be reached. The largest yards contain docks of all the types mentioned above. Some yards contain one or more slips where ships may be built and from which they are launched. A well-equipped yard contains all the modern appliances for handling heavy weights, such as cranes, shears, and other hoisting apparatus.

Large supplies of all kinds of material used in building, fitting out, and repairing vessels are stored in buildings best suited for the various classes of stores. Everything for the complete fitting out of a vessel for sea, even to clothing and food, is kept in store. Machine shops, blacksmith shops, sail lofts, and shops where work of all kinds is performed as required in the building and maintenance of ships are located in the yards, also the necessary steam power and lighting plants. The modern yards are provided with railroads, cars, locomotives, and traveling cranes for the handling with facility of all heavy weights between the shops, storehouses, building slips, and docks. Immense traveling cranes are provided for the building slips, so that the heaviest weights may be lifted and placed where needed for the shipbuilding. At the Washington Navy Yard many of the heavy guns for the navy are made as well as other ordnance material. At some yards a large tank is provided where models may be tested. Administrative buildings and quarters for the officers on duty at the yard are usually located in the yard, as well as barracks for marines, also a vessel for receiving and caring for recruits and sailors awaiting assignment. The navy yards of the U. S. are located at Portsmouth, N. H.; Charlestown, Mass.; Brooklyn, N. Y.; Philadelphia, Pa.; Pensacola, Fla.; Mare Island, San Francisco harbor, and at Bremerton, Puget Sound. The *Connecticut*, one of the largest of the modern battle ships in the U. S. navy, was built and completely equipped at the Brooklyn Navy Yard.

Doc'tor, person who has taken all the degrees of a faculty, and is empowered to teach and practice. It is bestowed by universities and colleges as an honorary distinction. The doctorate and the degrees which conduct to it were instituted early in the twelfth century. The first doctors were only of law and theology; medicine was afterwards added; and in the Univ. of Paris the four faculties of law, theology, medicine, and the arts or letters, were organized in 1340 as they are now. The title had an existence outside of the universities during the Middle Ages, and was bestowed on everyone of singular learning. It has also been given to some of the Fathers of the Church whose teachings have the highest authority. The title of doctor of the law existed among the ancient Jews. Those who figure in the Talmud are called "Doctors of the Talmud." The title of doctor has been bestowed on women by some university faculties.

Doctrinaires', French constitutionalist party which originated after the restoration of the Bourbons, in opposition to the Ultra Royalists; so called because they insisted that the state should be administered in accordance with rational doctrines and demonstrable political utility; came into power after the revolution of July, 1830, and were not heard of after February, 1848.

Dodd'ridge, Philip, 1702–51; English clergyman; b. London; became pastor of a Dissenting congregation at Kibworth, 1723, but left, 1725, went to Market Harborough, and removed, 1729, to Northampton, where he was principal of a theological seminary and at the same time pastor of a large congregation; most important works, "The Rise and Progress of Religion in the Soul," "The Family Expositor," "Course of Lectures on Pneumatology, Ethics, and Divinity," and "A Commentary on the New Testament"; wrote 374 hymns, some of which are admirable.

Dodge, Mary Abigail (pen name GAIL HAMILTON), 1838–96; American author; b. Hamilton, Mass.; a school teacher in her youth; one of the editors of *Our Young Folks*, 1865–67; chief works, "Gala Days," "Woman's Wrongs," "Skirmishes and Sketches," "The Battle of the Books," "Our Common School System," and "The Insuppressible Book."

Dodge, Mary Mapes, 1838–1905; American author; b. New York City; daughter of Prof. James J. Mapes; editor of *St. Nicholas*, 1873–1905; "Hans Brinker, or the Silver Skates," is the best known of her writings, which include also "Along the Way," a volume of poems, and "Donald and Dorothy."

Dodge, William Earle, 1805–83; American philanthropist; b. Hartford, Conn.; became an extensive importer and manufacturer in New York City; active member of many benevolent and religious societies, a member of the peace convention of 1861, and a Republican member of Congress, 1866–67; principal founder of the Syrian Protestant College at Beirut.

Dodg'son, Charles Lutwidge, 1832–98; English author; b. Daresbury, Cheshire; took holy orders, 1861; mathematical lecturer at Christ Church College, Oxford, 1855–81; published "Euclid and his Modern Rivals," "The Game of Logic," "Mathematica Curiosa"; also, under the pseudonym of "Lewis Carroll," "Alice's Adventures in Wonderland" and "Through the Looking Glass," besides other volumes of poems, parodies, and children's stories, including "Doublets," "Rhyme? and Reason?" and "Sylvie and Bruno."

Do'do, extinct member of the order *Columbæ* (pigeons); found only in the island of Mauritius; described as larger than a swan, of clumsy form, with a large head and enormous bill, the upper mandible being the longer and hooked at the point, short, thick legs covered

with scales, and such extremely short, weak wings that the bird could not fly. With the



THE DODO.

exception of the wing feathers the plumage was soft and downy.

Dodo'na, ancient city of Epirus; seat of a celebrated oracle and temple of Jupiter, for a time the most famous oracle of Greece except that of Delphi. This oracle was consulted by the Athenians, Spartans, and other nations, and its responses were delivered from an oak tree; or, according to another legend, by the agitation of a row of kettles suspended in the air, the noise of which was interpreted by priests as the answers of the oracle.

Doe, Jane and **John,** names inserted in legal documents—especially in process against criminals—for persons whose real names are either unknown or purposely withheld.

Dog, genus of *Canidæ* in general, but usually only the domesticated race—*Canis familiaris.* The domestication of the dog took place at a very early date. It seems probable that various species of wild dogs have been tamed, and that the wolf, coyote, and jackal have been the chief sources whence come the many breeds of dogs. These three species when young are easily tamed, cross with domesticated dogs, and produce fertile hybrids. The length of time that dogs have been domesticated, the purposes for which they are used, and the demands of fashion have given rise to the numerous breeds, not far from 200. The variation among them is immense. This great variation prevents any exact classification, since between any two extremes intermediate forms can be found. More recent writers have arranged them in races according to external characters, dividing them into Wolf Dogs, Greyhounds, Spaniels, Hounds, Mastiffs, and Terriers.

The Eskimo, collie, and Newfoundland are examples of *wolf dogs,* the first named with its pointed muzzle, erect ears, and savage disposition, being little removed from a wolf. The Leonberg is a cross between the Newfoundland and St. Bernard, this last being also included in the wolf dogs. The original St. Bernards were exterminated by a distemper in 1820 and replaced by the present breed, whose long-haired variety has been brought to an enormous size by English breeders. The *greyhounds* are an old race, a breed with curled tails being portrayed on Egyptian monuments three thousand years old. The coarse-haired deerhound is a descendant of an Irish dog used in hunting wolves and red deer, and approaches the staghound very closely, although this last is placed with the hounds. Greyhounds hunt almost entirely by sight, speed and wind having been cultivated at the expense of other qualities. The *spaniel* group includes the various spaniels and setters, the latter being a recent breed derived by selection from the former. Few setters now "set," although this name was given them from their indicating the presence of game by crouching instead of pointing, like the pointer. To the *hounds* belong the bloodhound, pointer, and related breeds, the group including those dogs which have the keenest scent, and rely on their noses rather than on their eyes. Many of them are noteworthy for speed and "staying" qualities. The *mastiffs,* characterized by shortness and breadth of muzzle and generally robust form, comprise such well-known forms as the English mastiff, bulldog, and pug. The present tendency is to breed mastiffs of a more slender, "leggier" build than formerly. The *terriers* comprise a number of small, active, and greatly varied breeds. The name comes from the Old French, in allusion to their digging habits.

The uses of dogs are manifold. They serve as beasts of burden, and in the icy N. furnish the sole means of winter travel. They participate in the sports of civilized man, and aid their savage masters in the chase, while among some tribes they not only help to obtain food, but are themselves cooked and eaten, as in the days of the Incas and Aztecs, when a special breed was regularly kept for this purpose, and fed exclusively on vegetable diet. Wild dogs, descended from the domesticated breeds, occur in various parts of the world; a well-established race is found in Cuba, and others in Africa and S. America, while even the pariah or street dog of the East has so far become a distinct breed as to have certain cranial characters of his own.

Dog'bane, plant of the genus *Apocynum* and family *Apocynaceæ,* having bell-shaped flowers, no style, and the fruit a pair of follicles. Some of the species are herbaceous, others shrubby, and some are found in colder climates than is usual for plants of this order. The dogbane of N. America (*Apocynum androsæmifolium*) is a perennial herbaceous plant about 2 ft. high, with smooth stem, milky juice, smooth ovate leaves, and light pink flowers. It grows in open, barren places from Canada to Georgia, and the bark of the root has some medicinal value as an emetic, diaphoretic, and in small doses as a tonic. This and the Indian hemp (*A. cannabinum*), which has similar but stronger medicinal properties, yields a copious fine flaxlike fiber, used by the Indians; but otherwise the plant is employed only for medicinal purposes.

Dog Days, or Canic'ular Days, the forty days between July 3d and August 11th. Canicular is derived from *Canicula*, the Latin name of Sirius, the dog star, which rose near July 1st. The ancients ascribed the great heat of summer to the influence of this star, but it was by accident only that its rising coincided with the warmest season. The time of its rising depends on the latitude of the country, and, owing to precession, is later every year.

Doge, title of the chief magistrate in the republics of Venice, Amalfi, and Genoa. The origin of the office in Venice dates back to 697. Previously Venice had been governed by seven tribunes. The doges were elected by the people, but the choice usually fell on a member of one of the powerful families. They were invested with almost absolute power till abt. 1172, when the legislative power was placed in the hands of a great council of 470 members. This council elected twenty-four of their members, who in turn elected twelve of their number, and upon these twelve the choice of the doge devolved. The first doge elected in this manner was Sebastiano Ziani, who introduced the custom of wedding the Adriatic Sea. This was a marriage ceremony which took place on Ascension Day, and typified the absolute dominion which the Venetians claimed over that sea. The office disappeared with the fall of the Venetian republic, 1797. Lodovico Manin, elected, 1788, was the seventy-third and last doge of Venice. The first doge of Genoa was Simon Boccanera, elected 1339. Like that of the Doge of Venice, his office was originally for life. In 1797, when the French occupied Genoa, the office of doge ceased to exist. In 1802 it was restored with the restoration of the republic, but finally disappeared in 1804. The republic of Amalfi in 897 A.D. exchanged its government by annually chosen consuls for the dogate, which was held for life; but its republican government ceased in 1350.

Dog'fish, popular name of several small species of shark, so named probably from their pursuing their prey like dogs hunting. The common dogfish is found in great quantities on the coasts of the Hebrides and Orkneys. The same species is abundant along the New England coasts and on the Pacific coast northward. It is caught for its oil. Most of the small spotted sharks are known as dogshark or dogfish. The dogfish of the W. states is the *Amia.*

Dog'gerbank, extensive sand bank in the middle of the German Ocean, between England and Denmark; length, 320 m.; average width, 40 m. In some parts it is covered with only 9 fathoms of water. Here are important cod fisheries. In October, 1904, some trawlers or fishing boats from Hull, England, were here fired upon by the Russian Baltic fleet under Rear Admiral Rojestvensky, then on its way to Port Arthur. The firing was done, as afterwards alleged, in the belief that Japanese torpedo boats were among the trawlers. One vessel was sunk and others were injured. Reparation having been demanded by the British Govt., an international commission of inquiry was instituted, and the sum of $325,000 was paid as indemnity.

Dog'ma, originally an opinion, afterwards an article of belief derived from authority. The term is sometimes applied to what are regarded as the essential doctrines of Christianity, as contained in the Scriptures or the writings of the Fathers of the Church. The term "doctrine" is a preferable one, as "dogma" is coming to be used in an unfavorable sense. See CREED.

Dog Star, popular name of Sirius (*q.v.*), a star of the first magnitude in the constellation Canis Major, and the brightest fixed star in the firmament.

Dog'watch, on shipboard, a short watch of two hours. There are two dogwatches—the first from four to six o'clock P.M., and the second from six to eight P.M.

Dog'wood, small tree, genus *Cornus*, family *Cornaceæ*, which includes the cornel trees or dogwoods. *C. florida* is well known for its white, showy involucral blossoms, appearing in May and June. The "poisonous dogwood" or "poison sumac" (*Rhus venenata*) is probably much the most poisonous to the touch of the



FLOWERING DOGWOOD.

native plants of the U. S. It may be distinguished from the harmless sumacs by its panicles, which are loose (not closely clustered in a spike, like the harmless ones), and which are axillary, while those of the harmless species are terminal. The common dogwood of Europe, found also in N. Africa, is a shrub of 14 to 15 ft. in height, with greenish-white flowers of an unpleasant odor.

Dole, Sanford Ballard, 1844– ; American legislator; b. Honolulu, Hawaii; son of an American missionary; admitted to the bar in Boston; practiced in Honolulu, 1870–87; Judge of the Supreme Court of Hawaii, 1887–93; on the abrogation of the Hawaiian monarchy (1893) he was chosen President of the Provisional Government; on the proclamation of the

republic of Hawaii (1894) became its chief executive; was Governor of Hawaii Territory, under U. S. jurisdiction, 1900–3; then U. S. District Judge there.

Dol'erite. See BASALT.

Dolet (dŏ-lā'), **Étienne,** 1509–46; French scholar; b. Orleans; a printer in Paris from 1538; warmly defended Cicero against Erasmus's sarcasms, and was burned as a heretic, on the charge of having used, in translating Plato's "Axiochus," an expression not warranted by the original; has been called "the martyr of the Renaissance.

Dolgoru'ki, princely family of Russia.—GRIGORI fought with distinction against the Poles, 1608–10.—In 1624 MARIA married Czar Michael, but died in four months.—YAKÓV (1639–1720) was kept a prisoner of war by the Swedes for ten years, and afterwards was confidential adviser of Peter the Great.—YURI (George) was killed in the revolt of the Strelitzes (1682) while fighting for Peter's claim to the throne; MIKHAIL, his son, perished at the same time.—IVAN aided in raising Anna to the throne, but her favorite, Biron, procured his exile and that of all his family; he was later recalled and executed (1739).—VASILI (1667–1746) filled high military and diplomatic offices under Peter the Great, Catherine I, Peter II. and Elizabeth.—VASILI, nephew of the preceding, commander in chief under Catherine II, conquered the Crimea, 1771.—VLADIMIR was for twenty-five years minister of Catherine II at Berlin.—MIKHAIL (1766–1808) served as aid-de-camp to Alexander I, 1805–6.—IVAN (1764–1823) spent most of his life in the public service, wrote many patriotic poems, and is noted for his epistles and satires.—VASILI (d. 1868) was war minister, 1849–68.—PETER (1807–68) wrote several works on Russia, for one of which he was banished and his estates confiscated.

Dol'drums, seamen's term for the region in the vicinity of the equator, which is usually subject to hot calms and vapor-laden air, varied by pouring rain, thunderstorms, and squalls. It is that part of the ocean which lies between the NE. and SE. trade winds. See CALMS.

Dolichocephalic (dŏl-ĭ-kō-sē-făl'ĭk), long-headed; applied to human skulls which have the occipito-frontal diameter (that from the back to the front) much in excess of the transverse diameter. The native Australians and W. African races afford extreme examples of this form of skull. Those skulls which have a relatively short occipito-frontal diameter are called *brachycephalic—i.e.,* short-headed. Examples of both forms are found among the remains of the prehistoric races of Europe.

Doll, toy made in the image of a child. Dolls have been in use from the earliest times, and those of the Greek and Roman children were buried with them when they died. Much ingenuity is often displayed in their construction, and some of the modern dolls can creep, walk, talk, and swim. Large quantities are manufactured in Germany, France, Switzerland, England, and the U. S.

Dol'lar (prefix sign, $), gold or silver coin of different values current in the U. S., Canada, parts of Spanish America, and several countries of Europe. In the monetary system of the U. S. it is the unit. It was coined exclusively in silver until 1849, when the coinage of gold dollars was authorized. The law of 1837 fixed the weight of the silver dollar at 412½ troy gr., of which 371¼ gr. was to be pure silver. The so-called trade dollar, created by the Act of 1873, and weighing 420 gr., has not been coined since 1883. The bullion value of the silver dollar, at the average price of silver, was $1.004 in 1873. It fell to .674 in 1892, and has since declined. The gold dollar weighs 25.8 gr. = 1.672 gm., and in exchange with Great Britain is usually estimated at 4*s.* 2*d.* The standard fineness for both silver and gold for coinage is nine tenths, one tenth being alloy. The gold coins of the U. S. are legal tender for all sums. They are double eagles, eagles, half eagles, and quarter eagles, valued respectively at 20, 10, 5, and 2½ dollars.

Dol'lart, The, gulf of the German Ocean; at the mouth of the Ems, between Hanover and Holland; 8 m. long and 7 m. wide; formed by inundations (1277–1362).

Döl'linger, Johann Joseph Ignaz, 1799–1890; German theologian; b. Bamberg, Bavaria; Prof. of Church History in the Univ. of Munich, 1826; for years a member of the First Chamber of the Bavarian Diet; opposed the decrees of the Vatican Council, particularly that declaring the infallibility of the pope; excommunicated, 1871; elected rector of the Univ. of Munich same year; took a leading part in the Old Catholic congresses of Munich, 1871, and Cologne, 1872; published "The Church and the Churches, or the Papacy and the Temporal Power," "Papal Legends of the Middle Ages," "Lectures on the Reunion of the Churches," etc.

Dol'lond, John, 1706–61; English optician; b. London; a silk weaver in his youth, and employed his leisure hours in the study of science and languages; in 1752 became a partner of his son Peter (1730–1820) in the business of opticians. They made telescopes of superior quality. John invented the achromatic telescope, for which he received the Copley medal of the Royal Society, 1758.

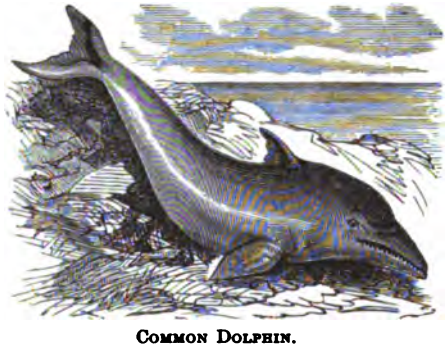
Dol'ly Var'den, common name of a trout, the large charr (*Salvelinus malma*); found in all the clear, cold rivers of the Pacific coast region from about Mt. Shasta N. to Kamtchatka. The species is similar to the brook trout of the E. U. S.

Dol'men, word of Cymric origin, nearly synonymous with cromlech. The proper dolmen consists of one large unhewn stone, resting on two or more unhewn stones placed erect in the ground. The term is sometimes applied to structures where several blocks are raised on pillars so as to form a sort of gallery. Near Saumur, in France, is a dolmen called Pierre Couvert, 64 ft. long and 15 ft. wide. Such structures are referred to prehistoric races, and to religious, sepulchral, or memorial purposes. See CROMLECH.

Dol'omite, mineral named in honor of Dolomieu, a French geologist; called also magnesian limestone; consists of carbonate of lime and carbonate of magnesia in variable proportions, sometimes nearly equal; extensively used as a building stone, and converted into good lime by burning; abundant in all parts of the world. A cleavable variety is called bitter spar.

Dolo'res Hidal'go, city of Mexico; in the N. part of Guanajuato, near the Rio de la Laja; the birthplace of Mexican independence. September 16, 1810, the curate, Miguel Hidalgo y Costilla, and others gave the signal of revolt against the Spaniards, called the "Grito de Dolores."

Dol'phin, cetaceous mammal of the Atlantic Ocean; the dolphin of the classic poets. It is 6 or 8 ft. in length, and very active. There are many similar species known as dolphins in various parts of the ocean. The dolphin or Dorado of modern sailors, the beauty of whose



COMMON DOLPHIN.

colors when dying is so celebrated, is a true fish, abounding in the warmer parts of the Atlantic, where it wages incessant warfare against the flying fish and other inhabitants of the sea. It is often eaten, although the flesh is rather dry and said to be sometimes poisonous.

Dom, or **Don,** title originally assumed in the Middle Ages by the popes; afterwards borne by bishops, and sometimes given to monks, as Dom Calmet and Dom Mabillon. In Portugal the title *dom* is confined to the king and his family. The Spanish *don* was formerly a title confined to noblemen, but is given by courtesy as indiscriminately as the English *Mr.* In the U. S. Roman Catholic dignitaries of German origin have the title *dom.*

Dombrowski (dŏm-brŏv'skē), **John Henry,** 1755–1818; Polish military officer; b. Pierszowicz near Cracow; fought against Russia, 1792–94; entered the French service, 1796; organized a Polish legion at Milan and served under the Cisalpine Republic; raised an army of 30,000 Poles, 1806; and distinguished himself at Dantzic and Friedland; gained a victory at Dirschau, 1809; took part in the Russian campaign of 1812.

Dome, hemispherical or nearly hemispherical vault or roof rising above the rest of a building, as in many Italian churches. The Romans were the first to erect large domes, and that of the Pantheon at Rome, 140 ft. in diameter (probably dating from the time of Trajan), has never been surpassed. The Byzantines first applied the dome to ecclesiastical structures, and made it a distinctive feature of their architecture. Rarely used in the Middle Ages, except in the Byzantine Empire, the dome became a favorite feature of Renaissance church architecture (Duomo at Florence; St. Peter's at Rome; St. Paul's London). Other modern domes are those of the Invalides and the Panthéon at Paris, and of the Capitol at Washington, the most important in America.

Dome'book, Doom'book, or **Dom-boc,** code of laws compiled by King Alfred, and ratified by the *witan* (wise men), gathered from the Kentish collection of Ethelbert, the Mercian laws of Offa, and the laws made by his own ancestor, Ina. The original text is lost. Alfred made few original laws, but collected what seemed to him to be good of those already existing.

Domenichino (dō-měn-ē-kē'nō), right name, DOMENICO ZAMFIERI, 1581–1641; Italian painter; b. Bologna; painted sacred subjects, of which the "Communion of St. Jerome," in the Vatican, is considered his masterpiece.

Domes'day Book, or **Dooms'day Book,** so called because it is a final authority in certain matters; ancient record of England containing a survey and statistical account of the state of that country, made by direction of William the Conqueror, and finished in 1086. It is very comprehensive and minute, and forms the basis of all historical accounts of those times. The original "Domesday Book" is preserved at Westminster.

Dom'icile, in law, the place where a person has his home or his legal place of abode. A distinction is made between residence and domicile. A person may have two or more residences, but can have only one domicile. A domicile may be said to be the place where a person has his true fixed and permanent home and principal establishment, and to which, in case he is absent, he has the intention of returning.

Dom'inant, in music, the fifth tone of the scale. The dominant is the ruling tone of the key, and next in importance to the first tone of the scale.

Dom'inic (Spanish DOMINGO DE GUZMAN), **Saint,** 1170–1221; b. Calahorra, Old Castile; became canon of the cathedral at Osma, 1195; removed to Lanquedoc, France, 1204, and, supported by a brotherhood of followers, preached against the Albigenses; transformed the brotherhood into a monastic order (see DOMINICANS), which was confirmed, 1216; was appointed in 1217 court preacher to the pope—an office still held by a Dominican; canonized by Gregory IX, 1234.

Domin'ica, British W. Indian island, midway between Guadeloupe and Martinique; 30 m. long by 11 in greatest width; area, 291 sq. m.; it is mountainous throughout, and the peaks

are the highest in the Lesser Antilles. The coasts, in great part, are sheer precipices; the harbors are mere roadsteads. Chief products: Coffee, fruits, cocoa, and some sugar. Dominica is one of the Leeward Islands colony, the central government being at Antigua. The island was named by Columbus in allusion to his discovery of it on Sunday (Domingo), November 3, 1493. It was settled by the French early in the seventeenth century, taken by the English, 1759; retaken by the French, 1778, and restored to the English by the peace of 1783. A few descendants of the ancient Carib Indians still live on the island. Pop. (1901), 28,894; capital, principal town, and port, Roseau, or Charlottetown.

Domin'ical Let'ter, in calendars, the letter used to denote Sunday. The Romans used the first eight letters of the alphabet (A to H) to mark the consecutive days of their recurring nundinal period. The early Christians adopted the same plan for marking the days of the week, dropping the last one (H) as unnecessary. In the Church calendar A has always stood for the first day of January, B for the second, and so on. Each day in the year has thus its calendar letter, according to what day of the week it falls on, and the letter which falls on Sunday is called the dominical letter of the year. February 28th has always the letter C, and March 1st has always the letter D. February 29th in leap year has therefore no letter provided for it, and this makes a change in the Sunday letter after February, so that in leap year there are two dominical letters.

Domin'ican Repub'lic. See SANTO DOMINGO.

Domin'icans, also called PREACHING FRIARS, an order of mendicant friars founded by St. Dominic at Toulouse; confirmed by Pope Honorius III, 1216; called in England, Black Friars; in France, Jacobins, from the Rue St. Jacques (Jacobus), where they first established themselves. In 1216 Honorius III constituted the order under the rules of St. Augustine, which enjoined almost continual fasts, perpetual silence, and other mortifications. It was introduced into England in 1221, and their first establishment made at Oxford. In 1276 the corporation of London granted the order two lanes near the Thames, where a monastery was erected, in the neighborhood now called Blackfriars. In 1425 Martin V recalled the prohibition, so far as the Dominicans were concerned, to possess real estate or other property, and donations and bequests immediately began to pour upon the order; it has erected some of the most magnificent ecclesiastical buildings in Christendom. To its preaching the order afterwards added lectures. At the beginning of the Reformation the Dominicans were the foremost expounders of theological science, and the strenuous upholders of that form of it (the scholastic) of which Thomas Aquinas had been the master builder.

The order has given to the Church more than 800 bishops, 150 archbishops, 60 cardinals, and 4 popes. The Dominicans are famous for their connection with the Inquisition. Their principal rivals were the Franciscans, and the two orders long divided the intellectual control of the Church. The Jesuits in the sixteenth century gradually took possession of the intellectual supremacy formerly exercised by the Dominicans. Dominican monks and nuns are, however, still found in most countries. After the discovery of America the order took a prominent part in the evangelizing of Mexico, Peru, New Granada, the islands of the Mexican Gulf, Florida, and New Mexico. They were introduced into California under the Spanish domination. Their first foundation in the U. S. was made in Springfield, Ky., 1807.

Dom'inis, Marco Antonio de, 1566–1624; Italian theologian; b. island of Arba, near Dalmatia; became a Jesuit and Prof. of Philosophy at Padua; wrote a work on light, in which the phenomena of the rainbow were explained for the first time; Archbishop of Spalatro and Primate of Dalmatia, 1598; suspected by the Inquisition, he fled to England, professed Protestantism, and was made Dean of Windsor, 1617; returned to Italy and to the Roman Catholic Church, 1622. In 1617 he published against that Church a work "On the Ecclesiastical Republic."

Dom'inoes, game of combined chance and skill introduced into Europe in the eighteenth century. It is played by two or more persons with twenty-eight flat oblong pieces of wood or bone, with blank backs, their faces marked with two divisions, each bearing either a blank or from one to six black spots. These pieces are laid backs up on the table, and the players draw a certain number at random. Then one piece is laid face up on the table by the first player, and the next player must put against it a domino bearing on one of its divisions the same number of dots, or in one of the divisions in the piece first laid. If 6—6 was first played and followed by 6—3, the next player may lay any piece bearing a six against the 6—6 or bearing a three against the 6—3. The game is won by the player who first places all his dominoes. If a player cannot match the numbers at each end of those laid on the table, he either passes or adds to his stock from the unused dominoes on the table. Various forms of the game are popular, such as matadore, in which the pieces are laid so that the adjoining pips shall in each case be seven; 6—5 would be matched by 1—2, 3—4 by 4—3, etc.

Domi'tian, or, in full, **Ti'tus Fla'vius Domitia'nus,** 52–96 A.D.; Roman emperor; son of Vespasian; succeeded his brother Titus in 81; was defeated by the Dacians, who compelled him to pay tribute; but in spite of his reverses, held a triumph, and assumed the triumphant titles of Germanicus and Dacicus; after 93 he became extremely cruel and suspicious, persecuted the Christians, and caused many innocent persons to be put to death; was himself assassinated in his palace; succeeded by Nerva.

Don. See DOM.

Don, Coun'try of the, government of SE. Russia; also known as the territory of the Don Cossacks; on the lower Don River, NE. of the Sea of Azov; area, 63,532 sq. m.; pop. (1906) 3,125,400; is a low, level plain, a part of the

S. steppe of Russia; alkaline and monotonous in the E., but somewhat diversified in the W., abounding in marshes and lakes, some of them saline; chiefly devoted to the rearing of cattle; the vine thrives along the right bank of the Don; fish form an important resource, and considerable salt is produced; country is well provided with railways; people mostly Cossacks; capital, Novo-Tcherkask.

Don (ancient *Tanais*), river of Russia; rises in the government of Tula; enters the NE. part of the Sea of Azov, near the town of Azov; total length, 1,125 m.; navigation difficult during low water, but when the water is high (in April and May) vessels can ascend 600 m. from its mouth. The Don in its upper course is connected by canal and railway with the Volga, and is generally closed by ice from November or December to March or April.

Don, river of Scotland, in Aberdeen; rises in Ben Aven, and enters the North Sea a mile from Old Aberdeen; length, including windings, 78 m. Nearly a mile from its mouth it is crossed by the "Brig o' Balgownie."

Donatel'lo (properly DONATO DI NICOLO DI BETTI BARDI), 1386–1466; Italian sculptor; b. Florence; chief works, the colossal equestrian statue of Gattamelata at Padua, bronze statue of David with Goliath's head in the National Museum at Florence, marble statue of John the Baptist in the same museum, large sculpture in relief of the Annunciation in the Church of Santa Croce, and the statues of St. Peter, St. Mark, and St. George, at the Church of Orsanmichele, all in Florence; the front of the high altar of St. Anthony at Padua, and the bas-reliefs of the out-of-door pulpit of the cathedral at Prato.

Donati (dō-nä'tē), **Giovanni Battista,** 1826–73; Italian astronomer; b. Pisa; as an assistant in the observatory of Florence, of which he became director, 1864, discovered several comets, including the one bearing his name (1858); made investigations on their spectra, the solar disk, and the stars; and published "Spectra di Quindici Stelle," 1862.

Dona'tion of Con'stantine, fictitious document by which Constantine is said to have bestowed on Pope Sylvester the temporal sovereignty over Italy, in return for a miraculous cure from leprosy. The mythical transaction was believed in for some time, and gravely urged by some writers in support of the papal claims to Italian territory.

Don'atists, party in the N. African Church which effected a schism that lasted from 311 A.D. till the sixth century; took their name from Donatus the Great, their bishop, 315–48. A powerful exciting cause of the schism was the question as to the mild or severe discipline of Christians who left the faith in times of persecution, the Donatists advocating rigorous measures; but there were numerous other questions involved in the controversy. Early in his reign Constantine excluded the Donatists from the privileges conferred upon the Church, and a fierce persecution ensued, lasting till 321, when the emperor granted them liberty of conscience. After his death the penal laws against them were revived, but they defended themselves with much spirit until, 361 A.D., Julian (the so-called Apostate) restored to them their full freedom. Prosperity followed, but controversies sprang up among them as well as with the Catholic party, until the Emperor Honorius ordered a conference between seven representatives on each side to take place at Carthage in June, 411. As a result, the emperor classed the Donatists as heretics (412), and all their clergy were banished (414). Donatism, as well as the African Church in general, was overwhelmed by the Vandal conquest (428 A.D.), yet it survived in a feeble condition for many years.

Donauwörth (dō'now-vört), town of Bavaria; on the Danube, at the mouth of the Wernitz, 25 m. NNW. of Augsburg; formerly a free town of the empire, but has declined in importance. Here Marlborough defeated the Bavarians, July 2, 1704, and here Gen. Soult gained a victory over the Austrian general, Mack, October 6, 1805. Pop. (1900) 4,367.

Don Car'los. See CARLOS.

Don'caster (ancient *Danum*), market town in the West Riding of Yorkshire, England; on the Don, 35 m. S. of York; has a fine parish church, a public library, manufactures of iron, brass, sacking linen, locomotives, railway cars, and agricultural machines, and a large corn market; famous for its annual horse races, for which Col. St. Leger founded the stakes in 1776.

Don'elson, Fort. See FORT DONELSON AND FORT HENRY.

Do'nets, river of S. Russia; chief affluent of the Don; rises in the government of Koorsk; enters the Don 40 m. NE. of Novo-Tcherkask; length, about 400 m.

Don'gola, former kingdom in Nubia, E. Africa; now a province in the Anglo-Egyptian Sudan as constituted, 1899; capital, New Dongola, on the left bank of the Nile, about 750 m. S. of Cairo, and 75 m. NW. of Old Dongola, capital of the former kingdom. This region was a center of the great revolt of the dervishes in 1882, and under the Mahdi and his successor, the Khalifa, they held control of a vast territory for about sixteen years. In the movement against the Mahdi, 1884–85, the British made New Dongola their base of operations, and on their withdrawal, 1886, the town, province, and all Nubia fell into the hands of the dervishes. An Anglo-Egyptian expedition under Gen. Sir Henry Kitchener began operations for the recovery of the lost provinces early in 1896, making New Dongola its first objective point. The town and province were occupied late in that year, and the overthrow of the Khalifa, who had succeeded the Mahdi, was completed in 1898, when Khartum and Omdurman were captured.

Don'iphan, Alexander William, 1808–87; American military officer; b. near Maysville, Ky.; began career as a lawyer in Lexington, Mo., 1830; commander of a brigade of militia selected to expel the Mormons from the state, 1838; as colonel of First Regiment, Missouri

Mounted Volunteers, joined Kearny's expedition to Mexico, 1846; defeated Mexicans defending Santa Fe; declared all New Mexico annexed to the U. S.; routed a superior force of Mexicans, December 25th, and again December 31st, near Chihuahua, which city he captured, May 1, 1847; and after march of 700 m. joined Gen. Wool at Saltillo.

Donizetti (dŏ-nē-dzĕt'tē), **Gaetano,** 1797–1848; Italian composer; b. Bergamo; produced his first opera, "Enrico," at Vienna, 1818; composed about thirty other operas, now forgotten; entered a new stage of development by his "Anna Bolena" (Milan, 1830); acquired a European fame by his "Lucia di Lammermoor," "La Fille du Regiment," "Poliuto," "La Favorita," and "Linda di Chamouni."

Don'jon, or **Dun'geon,** central building, tower, or keep of an ancient castle or fortress of the Middle Ages; often erected on a natural or artificial elevation. The lower story of the donjon was used as a prison.

Don Juan (dŏn hō-ăn'), mythical personage; by Spanish tradition, a profligate nobleman who killed in a duel the father of a lady he had attempted to dishonor. Having afterwards invited to a feast the statue erected to his victim, he challenges the spirit, whose existence he denies, to manifest itself to him. The spirit thereupon proves its power, and condemns him to perdition. This story was dramatized by Tirso de Molina; it also forms the subject of one of Molière's comedies; of Mozart's celebrated opera, "Don Giovanni," and of other works of fiction. In English it is best known in the form given it in Byron's poem of the same title.

Don'key. See Ass.

Donne (dŏn), **John,** 1573–1631; English poet; b. London; became a priest of the Anglican Church (1615), although of Roman Catholic parentage; gained distinction as the only eloquent preacher of his time; appointed Dean of St. Paul's, London, 1621; wrote elegies, satires, and other poems. Belonged to the school called "metaphysical poets," whose works abound in pedantic phrasing and far-drawn thought.

Don'nelly, Ignatius, 1831–1901; American politician and writer; b. Philadelphia; after 1856, resided in Minnesota, which state he represented in Congress several terms. As an author he was known chiefly for the eccentric geological theories propounded in "Atlantis" and "Ragnarok," and by his claim to have discovered a cryptogram, or word cipher, in Shakespeare's plays which transfers their authorship to Francis Bacon.

Don Quixote de la Mancha (dŏn kē-hō'tā dĕh lä măn'chä), hero of the celebrated romance in which its author, Miguel Cervantes de Saavedra, satirized the dangerous prejudices of race and blood, and the contempt of useful work which prevailed among the larger part of Spanish society at his time, and held up to his countrymen a higher moral ideal. The first part of the famous work was published at Madrid, 1605; the second, 1615; the first complete edition, 1637.

Doom, old name given in England to the Last Judgment, and to representations of it in churches by painting or otherwise.

Doom'book. See Domebook.

Doom or **Dum Palm** (*Hyphæne thebaica*), tree of upper Egypt and central Africa, where it sometimes forms forests, growing even in the deserts. The lower part of the stem is single, and invariably divides at a certain height into two branches, each of these again being bifurcated, always in two sets. This tree produces the gum resin called Egyptian bdellium, and its fiber is made into ropes.

Dooms'day Book. See Domesday Book.

Do'ra d'Is'tria (from *Istria,* Roumanian name of the Danube), pseudonym of Helena Ghika (Princess Koltzoff Massalsky), Roumanian writer, 1829–88; b. Bucharest; daughter of Prince Michael Ghika; lived partly in Russia, partly in Italy and Switzerland; principal works: "Monastic Life in the Oriental Church," "The Heroes of Rumania," "The Rumanians and the Papacy," "Women in the Orient," "On Women, by a Woman," "The Poetry of the Ottomans."

Dorama (dō-rä'mä), town of Arabia; in Nedjed, 30 m. NE. of Derayeh. The caravans moving between Persia and Mecca halt here to obtain supplies. In 1818 it was taken by Ibrahim Pasha, who killed nearly all the inhabitants.

D'Orbigny'. See Orbigny.

Dor'cas Soci'ety, benevolent association of ladies, usually of the same congregation, to provide the poor with clothing; so called from Acts ix, 39: "And all the widows stood by him weeping, and showing the coats and garments which Dorcas made while she was with them."

Dor'chester (ancient *Durnovaria*), capital of Dorsetshire, England; on the Frome and the S. Downs; 115 m. WSW. of London; has museum, free grammar school, large agricultural market, held weekly, and remains of the most perfect Roman amphitheater in England. Durnovaria was one of the principal stations of the Romans in England, and was surrounded with a wall, parts of which are still standing, and a fosse. Cromwell captured and held the town, 1645, and George Jeffries held his "Bloody Assize" here, 1685. Pop. (1901) 9,458.

Dorchester, formerly a separate town of Norfolk Co., Mass.; on Dorchester Bay, an arm of Boston harbor; 4 m. S. of Boston, to which city it was annexed, 1869, constituting the sixteenth ward; was settled, 1630, by Puritans, and named after Dorchester, England, from which many of them came. In March, 1776, Dorchester Heights, which commanded the town and harbor of Boston, were fortified by Washington, and the British evacuated the latter place, March 17th.

Dorchester, river port and capital of Westmoreland Co., New Brunswick; on the Memra-

cook River, near its mouth; 115 m. ENE. of St. John. Large ships can ascend from the Bay of Fundy to this place, which has an active trade. Gas coal and building stone are largely exported.

Dordogne (dōr-dōñ'), river rising in the S. central part of France; flows W. through the departments of Corrèze, Lot, and Dordogne, and enters the Garonne 13 m. N. of Bordeaux; about 350 m. long; navigable for 185 m.

Dord'recht. See DORT.

Doré (dō-rā'), **Gustave Paul,** 1833–83; French figure painter, illustrator, and sculptor; b. Strassburg; went to Paris at fifteen, and began his career by making sketches for illustrated papers; exhibited his first picture in oil, "Battle of Alma," 1855; officer Legion of Honor, 1879. His illustrations include designs for "Rabelais," "The Bible," "Don Quixote," Dante's "Inferno," Balzac's "Contes Drôlatiques," La Fontaine's "Fables," "Idyls of the King," "The Ancient Mariner," and Poe's "The Raven." As an illustrator he was marvelously fertile in invention.

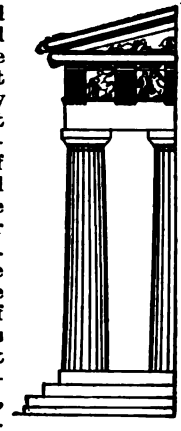
Dore'mus, Robert Ogden, 1824–1906; American chemist; son of Sarah Platt Doremus; b. New York; was one of the founders of the New York Medical College; in 1861, Prof. of Chemistry and Toxicology in the Bellevue Hospital Medical College, and soon afterwards took similar position in the College of the City of New York; has patented several processes, and developed in Paris (1862–64) the use of compressed granulated gunpowder.

Do'ria, one of the four most noble and powerful families of Genoa; attached to the Ghibelline party. In 1339 the families of Doria, Spinola, Grimaldi, and Fieschi, which had by their rivalry long troubled the republic, were exiled.

Doria, Andrea, 1466–1560; Italian admiral and patriot; called the restorer of Genoese liberty; b. Oneglia; entered the Pope's Guards, and served with honor under the Duke of Urbino and Alfonso, of Naples; returning to Genoa, was made admiral, 1513; suppressed the Turkish corsairs in the Mediterranean; commanded the fleet of Francis I in the war with Charles V; defeated the imperial fleet, 1524. In 1528 he became an ally of Charles V on the condition that Genoa should be independent; gave the citizens a free constitution; as admiral in the emperor's service, contributed to the conquest of Tunis, 1535; later was defeated by the Turks; took part in a disastrous expedition to Algiers, 1541.

Do'rians, one of the four principal branches or tribes of the Hellenic people; claimed that they were descended from Dorus, son of Hellen; supposed to have originally lived in Doris, from which they migrated to the Peloponnesus, and founded Sparta, Argos, and Messenia, and planted colonies in Crete, Sicily, and Asia Minor. The Dorians were the most powerful and warlike of the Hellenic tribes. They surpassed the Ionians in solidity and earnestness of character, but were less refined and ingenious.

Dor'ic Or'der, one of the orders of classic architecture, takes its name from the Dorians, its reputed inventors; is popularly considered the oldest of the Greek orders, but scholars think the Ionic or Ionian style was brought earlier from Asia into Greece. The Greeks showed a marked preference for the Doric, and used it until the time of the Roman conquest, developing it to a wonderful perfection, early realized in the Parthenon at Athens. The true Doric column rests upon a stylobate of three courses, together equal to one inferior diameter of the shaft, which is itself from four to six diameters in height. Its superior diameter is three fourths of the inferior, the latter being the unit of measure. This diminution is reached by an entasis or slight curve. Doric columns generally have twenty shallow flutes, separated by a sharp edge. The capital is about half a diameter in height, composed of an abacus, resting upon an echinus of variable proportions. The columns incline slightly inwards toward the main building. The architrave, frieze, and cornice were ornamented with simple yet beautiful moldings of various forms.



THE DORIC ORDER.

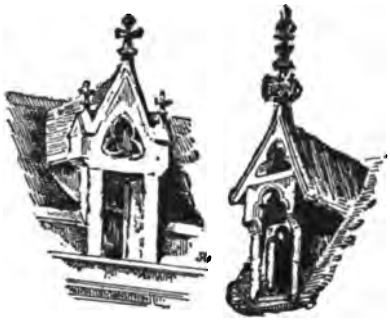
Do'rion, Sir Antoine Aime, 1818–91; Canadian jurist; b. Ste. Anne de la Perade, P. Q.; called to the bar, 1842; Queen's Counsel, 1863; Chief Justice of the Province of Quebec, 1874; represented Montreal in Canada Assembly, 1854–61; Hochelaga in that body, 1862–67, and in the Dominion Parliament, 1867–72; in 1872–74 he represented Napierville. He held at various periods the portfolios of Commissioner of Crown Lands, Provincial Secretary, Attorney-General, and Minister of Justice; was leader of the *Rouges*, or French-Canadian Liberal Party, of the Province of Quebec from his entrance into politics until his retirement; knighted, 1877.

Do'ris, small mountainous district of ancient Greece; bounded by Thessaly, Locris, Phocis, and Ætolia; the original home of the Dorians, and forms part of the nomarchy of Phocis in the modern kingdom. The name Doris is also given by some ancient writers to that part of Caria which was occupied by Dorian colonists and their descendants.

Dor'king, town in Surrey, England, noted for its breed of fowls, and also as the scene of "The Battle of Dorking," a fictitious narrative of the invasion and conquest of England by a foreign army, written by Gen. Sir George T. Chesney to show necessity for an improved system of national defense. Pop. (1901) 7,670.

Dor'mer, or Dormer Win'dow, window inserted on the inclined plane of the roof of a house, the frame being placed nearly vertically

with the rafters; often used for the purpose of lighting the attic or garret of modern



Dormer Windows.

houses. In some styles of architecture, large and showy dormers rising from steep roofs are an important part of the design, especially in



Rampant Dormer.



Square Dormer.

the later French Gothic and in the French and German Renaissance styles.

Dor'mouse, common name for the members of a group of small rodents related to the mice, but arboreal in their habits. Called dormice from their habit of lying dormant in winter, waking only on warm days to eat a little of the food, stored up in the fall. They have large eyes and ears, long hairy tails, and soft fine fur. They are found in Europe, Asia, and Africa. The common dormouse is reddish brown above, yellowish white below, and the tail is bushy. It is about as large as the house mouse, and is nocturnal in its habits. The fat dormouse is larger, and was regarded as a dainty morsel by the old Roman epicures. The garden dormouse frequents cultivated grounds, and often does considerable damage to choice fruit.

Dor'ner, Isaac August, 1809–84; German Protestant theologian; b. Neuhausen-ob-Eck, Württemberg; Prof. of Theology at Tübingen, 1837; Kiel, 1839; Königsberg, 1843; Bonn, 1847; Göttingen, 1853; and Berlin, 1862; wrote, besides other works, a "History of the Development of the Doctrine of the Person of Christ," "History of Protestant Theology, Particularly in Germany," "History of Pietism," "The Principle of our Church," "A System of Christian Doctrine," "System of Christian Ethics."

Dor'pat, or **Derpt,** town of Russia, government of Livonia; on the Embach, 138 m. NE. of Riga. Here Gustavus Adolphus founded in 1632 a university, which has a famous observatory and a botanic garden. Dorpat, founded in 1030, became an important town, and later sank into decay; captured, 1625, by the Swedes, and, 1704, by the Russians, under whom it revived. Pop. (1897) 42,420.

Dörpfeld (dörp'fĕlt), **Wilhelm,** 1853– ; German archæologist; b. Barmen; assistant in excavations at Olympia, 1877–81; assistant in the German Archæological Institute at Athens, 1882; associated with Heinrich Schliemann in his excavations, notably at Tiryns and Troy; second secretary of the German Institute at Athens, 1886; first secretary since 1887; joint editor of "Ausgrabungen zu Olympia," and of later editions of "Troja"; chief work, "Das griechische Theater" (with Emil Reisch).

Dorr's Rebel'lion, a popular uprising in Rhode Island (1841–42) under Thomas Wilson Dorr (1805–54), for the purpose of securing an extension of the suffrage. Up to that time the people of Rhode Island had lived under the charter adopted as early as 1663, according to which suffrage was greatly limited. Representation in the legislature was very unequal, in consequence of the growth of certain towns and the decline of others. The legislature was stubbornly opposed to any important change. New constitutions were proposed in 1824 and in 1834, but were defeated. A suffrage association was formed, and, at a convention brought together in 1840, a new constitution providing for universal suffrage and equal representation was adopted by a vote of 14,000 against 8,000. The populists proceeded with their election, and chose as governor the most conspicuous of the popular leaders, Thomas W. Dorr. Civil war on a small scale immediately followed. Dorr organized his government at Providence, while Governor King at Newport was helpless. Dorr made an attempt to get possession of the Providence arsenal, but was unsuccessful. The insurgents disbanded in June; in the following September, a state convention adopted a constitution which embodied nearly every provision that had been advocated by Dorr and his followers.

Dor'set, Charles Sackville (sixth Earl of), 1637–1706; English courtier and wit; son of Richard, fifth earl; appointed Lord Chamberlain, 1689; distinguished as a patron of literary men; wrote admired satires and songs.

Dorset, Thomas Sackville (first Earl of), 1536–1608; English statesman and poet; b. Buckhurst, Sussex; made Lord Buckhurst, 1566; Minister to France, 1570; Lord Treasurer of England, 1599; created Earl of Dorset by James I; wrote "Induction to the Mirror for Magistrates," and with Thomas Norton the tragedy, "Gorboduc, or Ferrex and Porrex."

Dort, or **Dor'drecht,** fortified town of the Netherlands; in S. Holland, on an island in the Meuse, 10 m. SE. of Rotterdam; traversed by canals; is accessible to large ships, and has trade in grain, flax, timber, and salt fish. Here are shipbuilding docks, sugar refineries, sawmills, and manufactures of tobacco, white lead, etc. The Synod of Dort met here, 1618, and condemned the doctrines of Arminius. Pop. (1906) 44,449.

Dortmund (dôrt'mont), town of Prussia; in Westphalia, on the Embscher, 47 m. NNE. of Cologne; has several fine churches, three hospitals, a Protestant gymnasium, and a *realgymnasium*; also manufactures of cotton, linen, and woolen fabrics, cutlery, and nails; was a city of the Hanseatic League, and was the chief seat of the Fehmic Court; was ceded to Prussia by the Congress of Vienna, 1815. Pop. (1905) 175,577.

Dort, Syn'od of, great synod of the national Church of Holland; held at Dort, 1618–19; consisting of ministers, ruling elders, and professors—deputies from the several states of the Netherlands—besides foreign deputies representing the Anglican and most of the Calvinistic churches. The synod was convoked by the States-General on account of the controversies between the Gomarists (Calvinists) and Remonstrants (Arminians), and its principal work was the preparation of canons setting forth the Calvinistic doctrines, and the publication of an ecclesiastical censure against the Remonstrants.

Do'ry, or **John Dory,** marine fish (*Zeus faber*) having the membrane of the back fin extending, like streamers, far beyond the spines; is found on the coasts of Europe, and attains a length of 18 in.; is among the various fishes pointed out by tradition as the one from whose mouth St. Peter took the penny, the spots on the sides being the impression of his thumb and finger.

Dossi (dŏs'sē), **Giovanni,** 1474–1558; Italian painter; b. near Ferrara; with his brother Battista worked much at Ferrara and at Modena; most important work still existing, the "Madonna and Saints," in the Ferrara Museum.

Dost, Mohammed, abt. 1798–1863; Afghan chief; ameer of Kabul abt. 1826; expelled by the British, 1840; restored, 1843, and ruled till his death.

Dostóyevski (dŏs-tō-yĕv'skĭ), **Fédor Mikhaïlovitch,** 1822–81; Russian novelist; b. Moscow; condemned to death for participation in a reform movement, 1849, but on the scaffold was banished to Siberia, and given several years of hard labor; pardoned on the accession of Alexander II (1855), but did not return to Russia (St. Petersburg) till 1860; works include "Poor People," "The Downtrodden and Oppressed," "Evil Hearts," "Crime and Punishment"; edited a periodical, *An Author's Journal.*

Douai (dō-ā'), fortified town of France; department of the Nord; on the Scarpe, 21 m. S. of Lille; has several fine churches and hospitals, theater, arsenal, botanic garden, and a national college representing the Douai Univ. founded by Philip II, 1562, with which was affiliated the famous college for the education of English Roman Catholic priests, founded by Cardinal Allen, 1562. The college was suppressed, and its property confiscated by the French Govt., 1793. Here are manufactures of cotton stuffs, lace, gauze, paper, glass, pottery, and soap. Douai existed in the time of Cæsar; was often besieged and taken by the French and Flemings. Pop. (1900) 33,649.

Dou'ai, or Dou'ay, Bi'ble, The, translation of the Bible by English Roman Catholic divines connected first with the college at Rheims, and afterwards with the college at Douai. The New Testament was published at Rheims, 1582; the Old Testament, then already translated, was published at Douai, 1609–10; both were translated from the Vulgate.

Dou'bleday, Abner, 1819–93; American army officer; b. Ballston Spa, N. Y.; graduated at West Point, 1842; one of the garrison of Fort Sumter, 1861; brigadier general of volunteers, February, 1862; major general, November, 1862; engaged in battles of Manassas, South Mountain, Antietam, Chancellorsville, and at Gettysburg commanded the First Corps in the first day's fight after the death of Gen. Reynolds; brevet brigadier and major general U. S. army; colonel of infantry, 1867; retired, 1873; published "Reminiscences of Forts Sumter and Moultrie in 1860–61," and "Chancellorsville and Gettysburg."

Dou'ble Stars. See BINARY SYSTEM.

Doubloon', Spanish gold coin nearly equivalent to $16. It is the double of a pistole.

Doubs (dō), ancient *Dubis,* river of France; rises in the Jura Mountains, and enters the Saône at Verdun-sur-Saône; total length about 250 m.; chief towns on its banks, Besançon and Dôle; is navigable to Dôle.

Doucet (dō-sā'), **Lucien,** 1856– ; French figure and portrait painter; b. Paris; studio in Paris. His work is individual and extremely brilliant technically; his portraits of women are graceful and refined. "Portrait of Mme. Galli-Marie," a remarkable work, is in the Marseilles Museum.

Doughty (dō'tē), **Thomas,** 1793–1856; American landscape painter; b. Philadelphia, Pa.; one of the earliest of the landscape painters of the U. S., having begun to paint about 1820; was self taught. Five of his pictures are in the permanent collection of the Pennsylvania Academy, Philadelphia.

Doug'las, name of an ancient noble family of Scotland which has produced many eminent men. The first member of the family on record was WILLIAM OF DOUGLAS, 1175–1200. By far the most famous member of the family before it entered the earldom was SIR JAMES, the Black Douglas, a hero in the Scotch war of independence, the bravest and most faithful supporter of Robert Bruce. The earls of Angus and the earls of Morton, besides other noble lines, belonged to the family of Douglas, which is now represented in the peerage by the earls of Selkirk. WILLIAM DOUGLAS, Earl of Liddesdale, and SIR WILLIAM DOUGLAS were famous warriors of their time. ARCHIBALD DOUGLAS, d. 1514, fifth Earl of Angus, was surnamed Bell the Cat, and headed the disaffected nobles who, 1488, imprisoned King James III. ARCHIBALD, d. 1557, sixth Earl of Angus, married, 1514, Margaret, sister of Henry VIII of England, and widow of James IV of

Scotland; rose to become regent of the kingdom; was exiled, 1528, by James V. GAWIN DOUGLAS, 1474–1522, one of the sons of the fifth Earl of Angus, was a celebrated poet; most remarkable production, a translation of Vergil's "Æneid" into Scotch verse; chief original poem, "The Palace of Honor."

Douglas, Stephen Arnold, 1813–61; American statesman; b. Brandon, Vt.; removed to Canandaigua, N. Y., and thence to Winchester, Ill., where he taught school; removed to Jacksonville, Ill., 1834, and began the practice of law; elected Attorney-General of the state, 1835; became a popular Democratic orator, and nicknamed "The Little Giant" in allusion to his diminutive stature in contrast with his mental vigor and capacity; elected to the State Legislature, 1835; judge of the Supreme Court of Illinois, 1841–43, resigning to enter the national House of Representatives; one of the five N. members who opposed the Wilmot Proviso (*q.v.*); entered the U. S. Senate, 1847, and by reëlection continued in that body until his death. In his last senatorial canvass he held joint discussions with Abraham Lincoln. During the session of 1853–54 Douglas reported the bill to organize the territories of Kansas and Nebraska, but proposed to disregard the Missouri Compromise (*q.v.*), which guaranteed their freedom from slavery, and to allow them "popular sovereignty," or, as its opponents called it, "squatter sovereignty." In 1856 he was a candidate of the Democracy for the presidential nomination, but withdrew in favor of Buchanan; in 1860 was supported by the N. wing of the party, Herschel V. Johnson being the candidate for Vice President, but received only twelve electoral votes; strove to avert Civil War, but heartily supported Lincoln's administration.

Douglas, chief town of the Isle of Man; on the E. coast; 80 m. NW. of Liverpool; stands on a picturesque bay; contains a customhouse, handsome villas, good hotels; is an important watering place. Pop. abt. 24,000.

Douglas Is'land, island SE. of Alaska, celebrated for its gold mines; N. of Admiralty Island and opposite Juneau; about 20 m. long by 10 m. broad, separated from the mainland by a very narrow strait, and is nearly opposite the mouth of Taku inlet.

Douglass, Frederick, 1817–95; American editor and lecturer; b. near Easton, Md.; son of a white man and a negro woman who was a slave; escaped to New Bedford, Mass., 1838; changed his name from Lloyd to Douglass; became agent of the Massachusetts Antislavery Society, and lectured in New England and Great Britain; edited at Rochester, N. Y., a weekly journal, *The North Star*; 1870, became editor of the *New National Era*; 1871, assistant secretary to the commission to Santo Domingo; was a presidential elector in New York in 1872; U. S. marshal, District of Columbia, 1877–81; recorder of deeds, District of Columbia, 1881–86; U. S. Minister and Consul General at Haiti, 1889–91; published "Narrative of My Experience in Slavery," "My Bondage and My Freedom," "Life and Times of Frederick Douglass."

Doukhobors (dō'kō-bōrs), "Spirit Wrestlers," religious sect, founded in the eighteenth century in S. central Russia by a noncommissioned Prussian officer who, settling there, promulgated doctrines combining the dogmas of the Calvinists, Anabaptists, and Quakers, guidance in all things by the "inner light" being a cardinal principle. After severe persecutions, lasting till 1801, they were removed to the S. part of the empire, and abt. 1834 to Transcaucasia, where their numbers increased to about 20,000. Their refusal to obey many of the civil laws and to perform enforced service in the army caused a bitter conflict with the government, 1895–98. In 1887 the sect became divided into two factions by the pretensions of rival candidates for the leadership; to obtain peace, and freedom from governmental interference, some 7,000 emigrated to Manitoba, Canada, 1899–1900. Here some of them discarded their tenet of vegetarianism; others gave up the use of domestic animals on the ground that it was wrong to compel them to work; others threw away their shoes because animals had been robbed of their skins to make them. Several times, under religious excitement, bands of the Doukhobors have left their farms to make pilgrimages to certain points where, as they believed, it had been revealed that Christ was to meet them. They have a kind of communal system, much like that in vogue throughout Russia, work by villages, rather than as individuals, and are highly prosperous.

Dou'ma, national representative parliament of Russia. The first Douma assembled in the Taurida Palace, St. Petersburg, May 10, 1906, with over 450 deputies in attendance, M. Mouromtseff, senior deputy for Moscow, being elected president. One of its first acts was to prepare a programme of legislation, which called for laws guaranteeing the freedom and equality of all classes before the law, the abolition of all privileges based on class, religion, or race, and the abolition of capital punishment. Want of confidence in the ministry was voted, and general opposition to the imperial government manifested. This Douma was dissolved by the czar, July 22d, and a new one ordered; the deputies of the first body assembled in Viborg, Finland, and issued a manifesto to the people; and the new Douma met March 8, 1907. The reformatory work of the Douma was greatly hampered, and in some instances thwarted, by the Council of the empire, which represented the old bureaucratic régime, and was practically superior to the popular assembly. June 16, 1907, the Douma was suddenly dissolved by the czar because it refused to surrender members charged with plotting against the state, while a committee was investigating the charges. The third Douma opened November 14, 1907.

Doum Palm. See PALM.

Dou'ro, large river of Spain and Portugal; rises in Old Castile, in the province of Soria; forms part of the boundary between Spain and

Portugal; traverses the N. part of Portugal, and enters the Atlantic 3 m. below Oporto; total length nearly 500 m. Rocks, sand banks, and the rapid current render its navigation difficult; most important affluent, the Pisuerga.

Dou'ven, Jan Francis, 1656–1710; Dutch portrait painter; b. Roermond, Holland; in 1684 settled at Düsseldorf, at the court of the Duke of Neuburg; visited Vienna, Madrid, and other cities for the purpose of painting the portraits of sovereigns and other noble personages, and executed so many works of this kind that he is well styled the court painter of Europe of that time.

Dove. See PIGEON.

Do've, Heinrich Wilhelm, 1803–79; German physicist; b. Liegnitz, Silesia; Prof. of Physics at the Univ. of Berlin, 1829, and made researches into the laws of climate and atmospheric phenomena; published, besides other works on meteorology, electricity, etc., "Meteorological Researches," "The Diffusion of Heat on the Earth's Surface," and "The Law of Storms."

Dove'kie, or Sea Dove. See AUK.

Do'ver, capital of the State of Delaware and of Kent Co.; on Jones Creek; 48 m. S. of Wilmington, 5 m. W. of Delaware Bay; is the seat of the State College for Colored Students and the Wilmington Conference Seminary, and has, besides the state capitol, a U. S. Govt. building and monuments to two distinguished citizens, Cæsar Rodney, a signer of the Declaration of Independence, and Col. John Haslett, commander of a Delaware regiment in the Revolutionary War, who fell at Princeton. The city is the center of a widely noted fruit-growing region, and is chiefly engaged in the packing of fruit, especially peaches, various vegetables, and poultry for wholesale markets. Dover was settled, 1687; incorporated abt. 1720; and made the state capital early in the Revolutionary War. Pop. (1900) 3,329.

Dover (ancient *Dubris*), seaport of Kent, England; on Dover Strait, 66 m. ESE. of London and 26 m. from Calais, France; is the point in England nearest to the Continent, and is the terminus of the Southeastern Railway; is defended by Dover Castle, a fortress of great strength and extent; contains a customhouse, a town hall, a theater, and a military hospital. The harbor is protected by a pier of solid masonry, 60 ft. wide, and extending about 1,800 ft. into the sea. Dover is the chief port of communication between England and France; is one of the Cinque Ports; and a popular summer resort. Pop. (1901) 41,794.

Dover's Pow'der (named from its inventor, Dr. Dover, an English physician); a sudorific composed of ipecacuanha and opium, 1 part each, with sugar 8 parts, rubbed together to a very fine powder. Where the brain is unaffected and the tongue and skin moist it is of great service.

Dover, Strait of, strait which separates England from France, and connects the English Channel with the North Sea; is about 20 m. wide at the narrowest part; depth, 6 to 29 fathoms. The English side of the strait is bordered by chalk cliffs, some of which are about 600 ft. high. Chalk cliffs also occur on the French shore. It has been proposed to connect England with the Continent by way of the Strait of Dover or the channel by a bridge, a tubular railway, or a tunnel, but all these schemes have met with government opposition.

Dow, or Douw, Gerard, 1613–75; Dutch painter; b. Leyden, Holland; a pupil of Rembrandt. He excelled in chiaroscuro and in technical skill, and finished his works with excessive delicacy. Among his works, which are small in dimensions, are "The Charlatan," "The Dropsical Woman," "The Dentist," and "The Village Grocer."

Dow, Lorenzo, 1777–1834; American clergyman; b. Coventry, Conn.; admitted to the Methodist Conference, 1798; soon dropped his official relations with that body; visited England and Ireland, 1799, 1805; preached against Romanism; in the U. S. directed his efforts against the Jesuits, preaching mostly in the South; attracted great congregations, despite the prejudices excited by his eccentricity of manner and dress; published "Polemical Works," "The Stranger in Charleston, or the Trial and Confession of Lorenzo Dow," etc.

Dow, Neal, 1804–97; American reformer; b. Portland, Me.; while Mayor of Portland, 1851, drafted a bill to prohibit the manufacture and sale of intoxicating liquors, which was passed by the Legislature and became known as the "Maine Law"; during the Civil War was colonel of the Thirteenth Maine Volunteers, and afterwards brigadier general; Prohibitionist candidate for President, 1880.

Dow'ager, widow endowed — that is, who either enjoys a dower from her deceased husband, or has property of her own brought by her to her husband on marriage, and settled on herself after his decease. In Great Britain the term is used to distinguish the widow from the wife of her husband's heir of the same name and title, thus the dowager duchess, dowager countess, etc. No man can marry a queen dowager without special license from the sovereign on pain of forfeiting his land or goods. A queen dowager does not lose her regal title when she marries a subject.

Dow'den, Edward, 1843– ; Anglo-Irish scholar and author; b. Cork; Prof. of English Literature, Univ. of Dublin, after 1867; secretary to the Liberal Union of Ireland; Commissioner of National Education, Ireland, 1896–1901; vice president Irish Unionist Alliance; works include volumes of Shakespearean studies; lives of Southey, Shelley, and Robert Browning, "Poems," "Studies in Literature," "History of French Literature."

Dow'er, in the common law of England, an estate for life which a widow has in one third part of all the lands and tenements of which

her husband was seized beneficially, or of an estate of inheritance at any time during the marriage. In the U. S. dower may sometimes be had in money, which by the doctrine of equitable conversion is treated as land. Whenever the husband's estate is defeated by a superior title, dower falls with it. The right cannot be destroyed by the mere act of the husband. Creditors also take subject to this claim. It can in general be barred only by the wife's own act, as by joining in a conveyance with the husband, or by a jointure settled before marriage. The husband often in his will, either expressly or by implication, gives his wife property in lieu of dower. In this case she may, after his death, elect to take such property or her dower, but cannot take both. In England the husband may dispose of his lands by will or otherwise, free from any claim of dower on the part of his wife. If, however, he dies intestate, his widow, under the statute of distribution, receives not merely for life, but absolutely, one third of his personal estate. In the U. S. the general rules of the English common law still prevail. As a general rule, also, at least one third of the husband's personal estate is given to the wife, as by the English statute of distribution.

Dow'ie, John Alexander, 1847–1907; Scottish adventurer; b. Edinburgh; claimed to be the natural son of a British officer; clerk in a store in Adelaide, Australia, for a time; returned to Edinburgh and studied at the University; pastor of a Congregational Church near Sydney, Australia; left the denomination, 1878, and built a tabernacle at Melbourne, where he practiced "divine healing"; removed to Chicago, Ill., 1890, where he organized the "Christian Catholic Church in Zion"; built a hospital, established a missionary training college, etc.; founded Zion City, 42 m. N. of Chicago; made it his headquarters, 1902; collected there 10,000 people; established various industries on a semicoöperative, profit-sharing basis; announced himself as Elijah III, and led a "restoration host" to New York, 1903, but by his failure to convert that city lost influence; made a tour of the world, 1904, traveling in royal style; planned a larger Zion City in Mexico; deposed, April, 1906, for extravagance, mismanagement, and more serious offenses.

Dow'latabad, fortified town of Hindustan; in the Nizam's Dominions; 10 m. W. of Aurungabad; is defended by a fortress which occupies the summit of an isolated rock about 500 ft. high, the summit of which is accessible only by a passage excavated in the interior. Near-by are the cave temples of Elora.

Down'ing Street, short street in Westminster, London, where the colonial and foreign offices and the official residence of the premier are located. As it is the place of the cabinet's meetings the name is sometimes used to signify the government. The street was named from Sir George Downing, Secretary to the Treasury, 1667.

Downpat'rick, capital of County Down, Ireland; near the mouth of the Quoyle (which enters Lough Strangford); 21 m. SSE. of Belfast; has a cathedral, hospital, and manufactures of muslin, linen, soap, and leather; is said to be the oldest city in Ireland, and was burned by Edward Bruce, 1315. Pop. abt. 3,000.

Downs, The, expression with two distinct applications. The two broad ridges of undulating chalk hills S. of the Thames River in England are called the Downs. They extend from the middle of Hampshire eastward; the N. Downs through Surrey and Kent to Dover, and the S. Downs through the SE. part of Hampshire to Beachy Head. Between the two ridges, the former of which is nearly 120 m. long, lies the valley of the Weald. The ridges contain no villages, but produce fine aromatic grass, and are the home of the famous Southdown sheep. A portion of the North Sea off the SE. coast of Kent, England, between the N. and S. Forelands is also called the Downs. It is important as a shelter for shipping, which is protected by the Goodwin Sands, a natural breakwater. This large harbor is 8 m. long and 6 m. wide, having an anchorage which varies from 4 to 12 fathoms in depth. It is a rendezvous for the British navy.

Dow'ry, in law, the marriage portion brought by a wife to her husband. This term is often confounded with dower (*q.v.*).

Doxol'ogy, form of praise said or sung in divine service, commonly at the close of a prayer. The Great Doxology, as it is called, is an expansion of the angelic hymn, and is sung in the Roman Catholic Church at the celebration of the eucharist. It begins with the words "Gloria in excelsis Deo." The Lesser Doxology is the "Gloria Patri," the substance of which appears in the metrical doxologies in use among Protestants generally.

Doyle, Sir Arthur Conan, 1859– ; British novelist and physician; b. Edinburgh; practiced medicine at Southsea, England, 1882–90; works include "A Study in Scarlet," "Micah Clarke," "Adventures of Sherlock Holmes," "Memoirs of Sherlock Holmes," "Return of Sherlock Holmes," "The White Company," "Exploits of Brigadier Gerard," "The Hound of the Baskervilles"; also "Songs of Action," "Halves," a play, and "The Great Boer War."

Doyle, Richard, 1826–83; English illustrator and caricaturist; b. London; one of the staff of *Punch*, and designed the cover of that paper, which has never been changed; but left *Punch*, 1851, because of the attacks of that paper on the new Roman Catholic hierarchy in England; illustrated many books, such as Thackeray's "The Newcomes," and published some collections of his work in *Punch*, such as "Manners and Customs of ye Englishe"; other humorous stories, chiefly told in pictures, such as "The Foreign Tour of Messrs. Brown, Jones, and Robinson"; and some fairy-land illustrations.

Dózy', Reinhart, 1820–83; Dutch Semitist; b. Leyden; 1850 Prof. of History at Leyden. Most of his works are contributions to the

history of the Moslems in Spain and N. Africa. Especially important are "Recherches sur l'Histoire et la Littérature de l'Espagne pendant le Moyen Age," "Histoire des Musulmans d'Espagne," a book of extraordinary charm," "Glossaire des mots espagnols et portugais dérivés de l'arabe."

Draa Wadi (drä wä'dē), longest river of Morocco. Rising in the Atlas Mountains of central Morocco, it flows S. to the boundary, which it then follows through the W. Sahara till it reaches the Atlantic at Cape Nun; the only river of the W. Sahara that has a constant flow of water; is not navigable.

Dracæ'na dra'co. See DRAGON'S BLOOD.

Drachenfels (drä'khĕn-fĕls), *i.e.*, Dragon's Rock, most celebrated of the Siebengebirge range or "Seven Hills," on the Rhine near Bonn, about 1,050 ft. high. On its summit are the ruins of a castle of the twelfth century, and two monuments commemorating the services of the Siebengebirge militia in the struggle of 1813–15. It has a quarry which furnished stone for the Cologne Cathedral.

Drachm (drăm), or **Dram**, measure of weight. The avoirdupois drachm is one sixteenth of an avoirdupois ounce; the apothecaries' drachm is one eighth part of a troy ounce. The orthography *dram* is commonly employed in avoirdupois weight, and *drachm* in apothecaries' weight. In apothecaries' measure a fluid drachm is one eighth of a fluid ounce.

Drachma (drăk'mä), silver coin, the unit of the monetary system of ancient Greece. The Athenian drachma was equivalent to six oboli, or nearly 20 cents, and weighed 63 to 66 gr. Other Greek states had drachmas of different values.

Drachmann (drăk'măn), **Holger Henrik Herholdt**, 1846– ; Danish poet; b. Copenhagen; in his youth studied art and won some reputation as a marine painter; published his first volume of verse, 1872; has produced lyrics, narrative poems, dramas, novels, tales, etc.; works include "Repressed Melodies," "Songs by the Sea," "Vines and Roses," the novels "Condemned," "Once upon a Time," and "Paul and Virginia," the melodramas "Gurre" and "Dædalus."

Draco (drā'kō), or **The Drag'on**, constellation near and around the N. celestial pole. It was from observations upon the star γ Draconis that Bradley was led to his brilliant discovery of the aberration of light.

Draco, or **Dracon**, Athenian legislator; archon, 621 B.C.; the author or compiler of the first written laws among the Athenians. This code was extremely harsh, the death penalty, according to Plutarch, being inflicted for every offense; in force until the time of Solon, who substituted milder penalties. The term *draconic* is sometimes applied to laws which are excessively severe.

Dracon'tium, genus of plants of the natural family *Araceæ*. The *D. polyphyllum*, a native of Guiana, India, and Japan, has a powerful action on the nervous system, and is used as a remedy for asthma. The flower emits an intolerable stench when its first opens. The *Dracontium* of American Pharmacopœia is the skunk cabbage.

Draft Ri'ots, certain outbreaks that occurred in New York City, July 13–17, 1863, occasioned by the first draft under the Enrollment Act of April 16, 1862, which provided for the enrollment of all able-bodied males between the ages of eighteen and forty-five to be chosen by lot. The draft was held by many to be not only unconstitutional, but unfair on account of the excessive quota required of the town districts, and the purchase of exemption from service for the sum of $300 caused dissatisfaction. The mob burst into a house at Third Avenue and Forty-sixth Street, where the drawing was going on, destroyed the papers, and set fire to the building. Then followed a series of outrages. Stores were plundered, buildings burned, and unoffending citizens murdered. As it was thought the draft was necessary to carry on an "abolition war," the fury against the colored race showed itself in the murder of negroes and the burning of the Colored Orphan Asylum. The crowd, swollen to thousands, was unchecked till troops were called out. From that time collisions were frequent, with the heavier losses on the side of the rioters; but for four days the tumult continued. Nearly 1,000 men, chiefly rioters, were killed during the four days. The loss of property was severe, but the owners were in part indemnified by the payment of $1,500,000 by the city government. Gov. Seymour petitioned the President for the suspension of the draft, and complained of the unfair apportionment, but Lincoln thought the matter too urgent to admit of delay. August 19th the draft was resumed in New York and completed without resistance within ten days.

Dra'go, or **Cal'vo, Doc'trine**, political principle propounded by the late Señor Calvo, a distinguished publicist of S. America, and, since his death, elaborated and urged for international acceptance by Señor Louis M. Drago, of Venezuela. It provides that nations should not employ force in seeking to compel the payment of pecuniary claims to their subjects or citizens by other nations. At the Pan-American Congress in Rio de Janeiro, 1906, the doctrine was energetically supported by the S. American countries, and the committee to whom it was referred reported in favor of submitting it to the International Conference at The Hague for consideration.

Drag'oman, in the Levant, an interpreter or guide for foreigners. The dragoman of the Sublime Porte is an important Turkish officer, who forms the medium of communication between his own government and foreign ambassadors. The term is also applied to the interpreters attached to European embassies and consulates in the Levant. They are usually natives of Italian extraction.

Drago'miroff, Mikhail Ivanovitch, 1830–1905; Russian military officer; an *attaché* in the

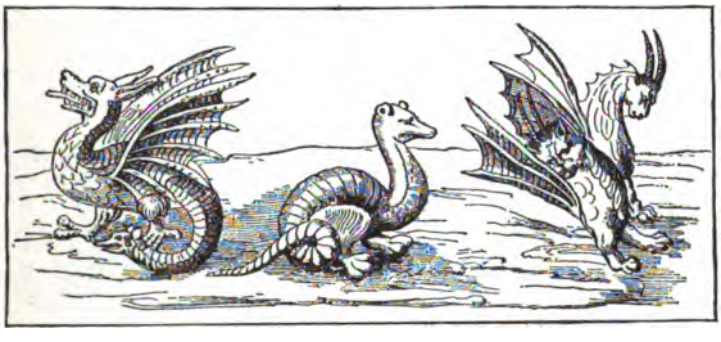
Austro-Prussian War; major general, 1868, and in command of the general staff at Kiev; commanded the advance guard in the Russo-Turkish War, 1877–78; afterwards placed at the head of the War Academy, St. Petersburg; made Governor General of Kiev, 1898, but removed on charges of cruelty, 1903; later a member of the Council of State; the leading authority on war tactics in Russia; published "Subordination," "The French Soldier," "War is an Inevitable Evil," "Joan of Arc."



Flying Dragon.

Drag'on, small, inoffensive E. Indian lizard of the genus *Draco*, called winged dragon, or flying dragon, remarkable for an expansion of the skin on each side, supported by the greatly elongated last six ribs, forming a kind of wing, which sustains the animal like a parachute; when not in use the ribs and fold of skin are folded along the body.

Dragon, in mythology, a monster usually represented as a huge serpent of abnormal form, winged, head crested, and body covered with scales.



Winged Dragons. (From a manuscript of the fourteenth century.)

Drag'onet, any fish of the genus *Callionymus* and family *Gobiidæ* (goby family); found in the temperate seas of the Old World. There is no air bladder; the ventral fins are larger than the pectorals and placed under the throat, and the gill openings are reduced to a small hole on each side of the nape. One of the finest species is the dragonet of a golden color, variegated with sapphire blue.

Dragon Fly, popular name of the members of the families *Libellulidæ*, *Æschnidæ*, and *Agrionidæ*. They have large globular heads; strong bones of the lower jaw; eyes lateral, large, and projecting; antennæ short; four narrow gauzelike wings; strongly veined, and the abdomen often remarkably slender. They are most common in the warmer climates, and frequent marshes, lakes, and rivers. Their



A Dragon Fly.

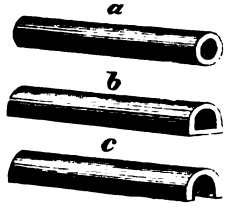
food is insects. They are sometimes known as "devil's darning needles."

Dragonnade', persecution carried on with the aid of troops; specifically, one of a series of persecutions which the French Protestants suffered in the reign of Louis XIV; so called because dragoons (in French *dragons*) were employed as instruments of the persecution. Troops were quartered in Protestant households and allowed to subject the inmates to every kind of insult and injury, from which the only escape was conversion to the Roman Catholic faith.

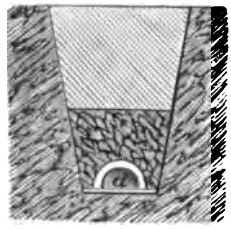
Drag'on's Blood, or Gum Dragon, resin obtained from various trees growing in warm climates. Among these are the *Dracæna draco*, the red sandalwood of the E. Indies, and the *Calamus draco*, an E. Indian rattan palm. The dragon's blood of commerce dissolves in oil, alcohol, and ether. The solution is used for staining leather, wood, and even marble. The resin is also an ingredient of some varnishes and lacquers. It comes from the Moluccas, Socotra, Brazil, and Teneriffe.

Drain'age, art of freeing land from superfluous water. The system of drainage adopted for cities and towns is called sewerage. The art of drainage is of especial interest in its application to the reclaiming of wet lands, and the improvement of those through which water does not find a ready exit. Where natural streams are not convenient for receiving the drainage from the underground ditches, open ditches may be made in the lower grounds by laying tiles in trenches and covering them with soil. Sometimes coarse stones are used, but tiles are preferable because less liable to become clogged. Several kinds of tile are made, each being suitable under certain circumstances. They are from 3 to 10 in.

in diameter, and from 1 to 2 ft. long, are made of nearly the same kind of clay as brick, and are baked sufficiently to produce as much porosity and toughness as possible. The different forms generally in use are cylindrical or semicylindrical, called sole tile when closed, forming a tube, and horseshoe tile when open. The horseshoe tile may be laid on flagging or boards, and either form should be placed deep, out of the way of frost and the plow.



A. Pipe Tile *B.* Sole Tile. *C.* Horseshoe Tile.



Section of an Underground Drain.

Drainage (in physical geography). See River and Valley.

Drainage Tube, in surgery, a piece of tubing, usually of rubber, placed in a wound so that pus or other fluid will flow off through it, thus lessening the chances of spreading infection and putting the tissues in better condition for healing. In small wounds, a wick of gauze is used for the same purpose.

Drake, Sir Francis, 1540–95; English navigator; b. Tavistock, Devon; commanded a vessel in the expedition of Capt. Hawkins to Mexico, 1567; lost his property in this enterprise, and, having fruitlessly petitioned the Spanish court for indemnity, sailed with the avowed object of pillaging the Spaniards. Under a commission from Queen Elizabeth, he fitted out an expedition, 1572, and made a descent on New Granada, capturing and plundering various Spanish settlements. In 1577 he sailed with five vessels, pillaged the Spanish settlements of Peru and Chile and took possession of California. After circumnavigating the globe he returned to England, 1580, and was knighted. After the rupture between Elizabeth and Philip II, Drake captured and plundered Cartagena and several other towns on the American coast, and burned the forts of San Antonio and St. Augustine. In 1587, in command of thirty vessels, he destroyed 100 ships in the harbor of Cadiz, and captured papers from which the English first learned the value and methods of the E. India trade. In 1588, as vice admiral, he commanded one squadron of the fleet which defeated the Spanish Armada; in 1589, ravaged the coasts of the Spanish peninsula. In 1592–93 he was a member of Parliament. In 1595 he sailed with twenty-six vessels, in company with Admiral Hawkins, to attack the W. Indies. After burning Santa Marta, Rancheria, Nombre de Dios, and Rio Hacha, he died near Porto Rico.

Drake (drā'kĕ), **Friedrich,** 1805–82; German sculptor; b. Pyrmont; best known for his allegorical group of the "Eight Provinces of Prussia," 1844; in the castle of Berlin an equestrian statue of King William I of Prussia for the bridge over the Rhine at Cologne; and the colossal figure of "Victory" in Berlin.

Drake, Joseph Rodman, 1795–1820; American poet; b. New York City; a volume of his works, published, 1836, includes his longest imaginative poem, "The Culprit Fay," and some spirited verses entitled "The American Flag."

Drakenberg (drā'khĕn-bĕrg) **Range,** highest and longest portion of the series of mountain buttresses in S. Africa running nearly parallel with the coast of the Indian Ocean and forming the divide between the rivers tributary to the Atlantic and those flowing to the Indian Ocean. This range extends from about 31° S. latitude to near the S. boundary of the Transvaal, about 500 m., at a mean distance from the sea of about 120 m. Its SE. slopes, exposed to abundant rain, are greatly worn by denudation, and show many valleys and jagged peaks, some of which are imposing summits—*e.g.*, Giant Castle, 9,657 ft.; Champagne Castle, 10,357 ft.; and Monts aux Sources, 10,000 ft.

Dram. See Drachm.

Drama (drä'mă), originally the exhibition of human actions (especially those which reveal the feelings and passions) on the stage. The ancient Greek drama, comedy as well as tragedy, had its origin in the worship of Bacchus (Dionysus). The Dionysian dithyrambs sung at the festivals of Bacchus sometimes expressed wild and boisterous gayety, at other times passionate sorrow. From the former was at length developed the old Greek comedy, which attained perfection in the plays of Aristophanes; from the latter arose the Greek tragedy, masterpieces of which are the works of Æschylus, Sophocles, and Euripides. The Roman drama was derived from the Greek, to which it was much inferior. The most celebrated Roman dramatic poets, Plautus and Terence, appear to have taken Menander and Philemon as their models, and their productions have exercised considerable influence on the modern comedy. In tragedy ancient Rome produced one truly great poet, Seneca.

The Hindoo drama, quite independent of the drama of Europe in its origin, has produced some works of great merit, the most celebrated of which is the "Sakoontala, or the Lost Ring," of Kalidasa (supposed to have lived abt. 50 B.C.)—which has received the highest commendation from some of the most eminent critics of modern Europe, and been pronounced worthy of Shakespeare. The Chinese also have a drama, but greatly differing in some respects from that of the W. nations; a single piece being often extended through portions of several successive days. In modern times the drama has been cultivated with success, especially by the Italians, Spaniards, French, English, and Germans. For a long period the French were generally supposed to surpass all other nations in the genius and skill of their dramatic writers, as well as in the performance of their actors. The French critics in-

sisted on adherence to the rules of the classic drama, and particularly to "the three unities." Until the time of Lessing the German theater was merely a reflection of that of Paris, but Lessing taught his countrymen to throw off the trammels and affectations of a foreign school, and to give freedom to the cultivation of national genius. Among German dramatic writers, Goethe and Schiller occupy the foremost rank. Denmark has also produced some eminent dramatists, among whom Ohlenschläger is the most celebrated. Among the best Italian dramatists are Goldoni in comedy, and Alfieri, Manzoni, and Silvio Pellico in tragedy. The Spanish drama has many productions displaying genius, but none worthy to rank with the greatest dramatic works of Greece, England, Germany, or France. The most celebrated names in Spanish dramatic literature are Lope de Vega and Calderon, the former surpassing all writers in the marvelous fertility of his genius; the latter preëminent for the brilliancy of his imagination, as well as for the fertility of his invention, but neither of them producing any work of the highest order.

In comedy the writers of no other nation, either in ancient or modern times, have equaled the French. The best plays of Molière are unrivaled, and unapproached, by those of any other author, Shakespeare, Goethe, and Schiller excepted. In tragedy, Corneille, Racine, and Voltaire all exhibit genius of the highest order, but Racine, in the natural, graceful simplicity, as well as in the exquisite finish, of his productions approached most nearly to the best Greek tragedy.

The dramatic literature of England presents in the Elizabethan age a group of excellent writers, each subordinate in fame, however, to Shakespeare, the greatest dramatist of any age. In his comedies Shakespeare is not inferior to Molière, and in his tragedies, not merely in the exhibition of the conflict of the mightiest human passions, but also in his representation of the workings of the most intricate and subtlest of human motives, he has no equal.

Beaumont and Fletcher, Chapman, Decker, Ford, Greene, Heywood, Ben Jonson, Lyly, Marston, Massinger, Middleton, Peele, Shirley, Tourneur, and Webster were among the brightest stars of the Elizabethan galaxy, while Marlowe at times is scarce inferior in brilliancy to Shakespeare himself.

The theaters were closed during the Puritanic rule of the Commonwealth, but the restoration of Charles II was followed by a dramatic revival which produced some of the cleverest work of such writers as Dryden, Shadwell, and Wycherly. These, however, are all too tainted with the moral looseness of their age. The age of Queen Anne produced Addison's "Cato" and Goldsmith's and Sheridan's comedies.

The dramatic works of modern English poets, as Browning and Tennyson, seem to be better fitted for reading than for the stage. Among modern popular English dramatists are: H. A. Jones, A. W. Pinero, and G. B. Shaw. In modern France, a reaction against the classical dramas was led by the romanticists headed by Victor Hugo. Dumas, Sardou, Scribe, Rostand, and Merimée are among the best-known modern French dramatists. The influence of the Scandinavians, Björnson and Ibsen, has extended beyond their native land.

Dram'men, seaport of Norway; in Aggershuus, on both sides of the Drammen River, near its entrance into the Christiania Fiord; about 24 m. SW. of Christiania; has a college, extensive sawmills, and manufactures of chicory, sailcloth, ropes, etc.; exports large quantities of timber. Pop. (1900) 23,093.

Dra'per, Henry, 1837–82; American physicist; b. Prince Edward Co., Va.; son of John W. Draper; Prof. of Physiology in Univ. City of New York, 1860; best known for his work in celestial photography, including a remarkable photograph of the moon, his discovery of oxygen in the sun, his establishment and conduct of the observatory at Hastings-on-Hudson, N. Y., and his personal manufacture of the great reflector there installed.

Draper, John William, 1811–82; American chemist and writer; b. near Liverpool, England; educated at the Univ. of London; came to the U. S., 1833; Prof. of Chemistry and Physiology at Hampden-Sidney College, 1836–39; Prof. of Chemistry in the Univ. of New York, 1839, and in the medical department of that university, 1841. He took the first photographic portrait ever taken from the life, 1839; discovered many of the fundamental facts of spectrum analysis, and published them, 1841–50; author of "Human Physiology, Statistical and Dynamical, of the Conditions and Course of Life in Man," 1856; "History of the Intellectual Development of Europe," 1863; "History of the American Civil War," three volumes, 1867–68, and of numerous monographs on mathematics, chemistry, and optics.

Draughts (drăfts). See CHECKERS.

Drave, river of Europe; rises in the Tyrol, and flows nearly E. through Carinthia and Styria, to the W. frontier of Hungary; afterwards runs SE. and forms the boundary between Hungary on the left and Croatia and Slavonia on the right, until it enters the Danube 14 m. E. of Essek; length nearly 400 m.; navigable for over 200 m.

Draw'ing, ordinarily, the applying of lines and tints to a flat surface in such a way that a picture shall appear there. The drawing of an engineering draughtsman, however, does not produce a picture of a machine or a canal lock, but a conventional diagram by means of which the machine, etc., may be correctly made or put together. In like manner architectural drawing, as of a plan or section, will not produce a picture of a house or of any part of one. These kinds of drawing, by means of straight ruled lines, curves drawn mechanically, etc., are called *mechanical drawings.* Perspective and isometrical perspective are varieties of mechanical drawing, because they are produced by rule and with instruments of accuracy, but their

purpose is the representation of objects nearly as they look to the eye, so that these methods approach artistic or free-hand drawing in their results. This last is the kind of drawing usually meant when the word is used alone.

Such free-hand drawing may be done with the lead pencil, with *crayons*, with powdered crayon or *sauce* and the stump or *estompe*, which spreads the black powder over the paper, and may produce very delicate gradations, with a hard point on tinted paper, with pen and ink, with the brush and India ink or sepia, or bister or other one-colored material, and, finally, with precisely similar materials, but of several or many colors. There are also some curious and unusual methods of drawing, as with a hot metal point which burns and chars a smooth surface of wood (pyrography). Moreover, it is really drawing that an etcher does on the surface of his varnish, or a drypoint engraver on the copper, though it may be doubtful whether the term should be employed for engraving with the burin.

The concrete term *a drawing* is applied to any piece of the mechanical work of architectural, engineering, or machinist draughtsman, also the slightest scrawls or feeble attempts of children and savages, and in writing and talking about the fine arts, to all pictures on a flat surface, not incised nor in relief, except oil paintings, frescoes, the larger and more elaborate paintings on walls of any kind, and the more elaborate tempera pictures of old times. Thus in the exhibitions and studios it is customary to use *picture* for an oil painting and *drawing* for a water color. See ILLUSTRATION; PAINTING.

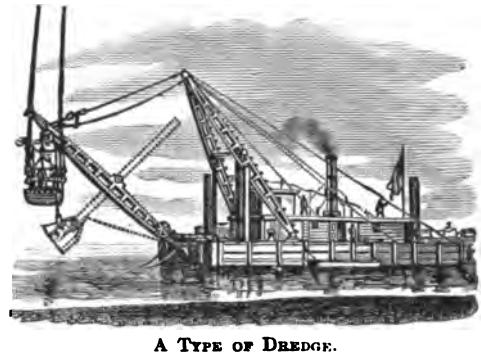
Draw Po'ker. See POKER.

Dray'ton, Michael, 1563–1631; English poet; b. Hartshill, Warwick; chief work, "Poly-Olbion," 1613, a poetical description of the mountains, rivers, valleys, and forests of Great Britain, with the traditions connected with them; poet laureate, 1626; other works, "The Barons' Wars," 1596; "Poems, Lyric and Heroic," 1606; "Nymphidia," a fairy poem, 1627, and "The Muses' Elysium," 1630.

Drayton, Percival, 1812–65; American naval officer; b. S. Carolina; brother of Thomas F. Drayton, who became a Confederate general; entered the navy, 1827; took part in the Paraguay expedition, 1858; in new monitor *Passaic* bombarded Fort McAllister, and was in first attack on Fort Sumter; commanded Farragut's flagship, the *Hartford*, in battle of Mobile Bay; after the war was chief of the Bureau of Navigation.

Dream, series of thoughts, feelings, and acts of the imagination occurring in sleep. In some cases the reasoning powers are abnormally active in dreams, but in general the mental action is incongruous. Dreams usually are evidence of imperfect sleep. They take their character from some preceding state of the mind, and are often modified by the conditions of the health. The Bible speaks of dreams as sometimes prophetic or suggestive of future events. This belief has prevailed in all ages and countries, and there are numerous modern examples, apparently well authenticated, which appear to favor this hypothesis. The interpretation of dreams was a part of the business of the soothsayers at the courts of Egypt, Babylon, and other ancient nations.

Dredg'ing, excavating the sediment that collects in harbors and channels; also applied to the scooping up of oysters, or anything else, from the bottom. Dredging machines are of two principal modes of construction. The machine generally used for deepening channels is an endless chain with scoop buckets, placed in a frame which may be raised or lowered in



A TYPE OF DREDGE.

a well in the middle of a scow. The other kind consists of a pair of shovel blades, suspended by stout chains from a crane; when closed they form a bucket, which is raised and lowered by a chain passing round a drum. Sometimes in place of a bucket a strong grapple is used. The same form of dredge on a smaller scale, usually worked by a hand windlass, sometimes by steam, is used for dredging for oysters.

Dred Scott Case (Scott vs. Sandford, 19 Howard 393); notable case decided by the U. S. Supreme Court, 1856. Dred Scott, a negro slave, was taken by his master, Dr. Emerson, from Missouri to Illinois and then to Wisconsin, where he married and had two children born to him. Returning to Missouri he sued for his freedom, on the ground that he had lived in a free state, and won his case. His master appealed, and the State Supreme Court reversed the first decision. Scott then sued in the Federal Court, lost his case, appealed to the U. S. Supreme Court, and again lost. On account of the importance of the case, Chief Justice Taney, in delivering the decision, made an historical survey of the public opinion of the civilized world concerning the African race at the time of the formation of the American Constitution. Among other things he said: "They (the Africans) had for more than a century before been regarded as beings of an inferior order, and altogether unfit to associate with the white race, either in social or political relations, and so far inferior that they had no rights which the white man was bound to respect." Much injustice has been done him by an erroneous statement, still occasionally repeated, that the chief jus-

tice had himself affirmed that the negro had "no rights which the white man was bound to respect."

Dreibund (drī'bŏnt). See TRIPLE ALLIANCE.

Drelincourt (drĕh-lăn'kōr), **Charles**, 1595–1669; French Protestant minister; b. Sedan; pastor at Charenton, near Paris, for many years; one of the first to make practical applications of scriptural texts; chief work, "Consolations against the Fear of Death," to promote the sale of which in England it was said Defoe invented his story "The Apparition of Mrs. Veal," in which that lady came from the other world to recommend the book to her friend Mrs. Bargrave.

Dres'den, capital of Saxony; called the "Florence of the Elbe"; in a beautiful valley on both sides of that river; 116 m. S. of Berlin. The chief object of interest is the Zwinger, built in the rococo style, 1711–22, by Augustus the Strong, originally intended as the vestibule to an enormous palace, now containing the celebrated Royal Picture Gallery rivaled only by those of Florence and the Louvre.

Dresden is of Slavonic origin, and was known as early as 1206. In 1270 it became the capital of Henry the Illustrious, Margrave of Meissen. In 1485 it fell to the Albertine line, which has since held it. From 1405 to 1510 it suffered severely in the Seven Years' War; also in 1813, when it was the headquarters of Napoleon's army, and during the Revolution of 1849; was occupied by the Prussians in 1866; since 1871 has been greatly improved and has increased rapidly in population. Pop. (1905) 516,996.

Dresden, Bat'tle of, between the French and the allied armies of Russia, Austria, and Prussia, August 27, 1813. Dresden was occupied by a French army of 30,000 men, when, on August 23, 1813, the army of the allies appeared before it. Napoleon, with the main army, came to relieve it, and entered the city on the 26th of the same month. Schwarzenberg, the commander of the allied army, immediately assaulted and bombarded the city. Having been repulsed by a sally of the French guard on the 26th, he renewed the attack on the 27th, when a great pitched battle was fought, Napoleon gaining the victory. The French were forced to surrender the city on November 11th.

Dress. See COSTUME.

Dreux (drö), town of France; department of Eure-et-Loir; on the Blaise about 50 m. WSW. of Paris; has a fine Gothic church, townhall, and manufactures of serge, woolen hosiery, hats, etc. Within the precincts of the old half-ruined castle of the twelfth century, which crowns the hill overlooking the town, a chapel of great magnificence was begun, 1816, by the Dowager Duchess of Orleans, and completed by Louis Philippe. At Dreux the Roman Catholic army, led by Constable Montmorenci, defeated the Prince of Condé and the Huguenots, December 19, 1562.

Drew, Daniel, 1797–1879; American capitalist; b. Carmel, N. Y.; began active life as a cattle drover; conspicuous as a steamboat builder, still later in connection with railways, and as a leader in the stock speculations of Wall Street; distinguished for liberality to certain educational interests of the Methodist Episcopal Church, having founded the Drew Ladies' Seminary at Carmel, N. Y., and the Drew Theological Seminary at Madison, N. Y.

Drew, John, 1825–62; Irish-American actor; b. Dublin; first appeared at the Bowery Theater, New York, in 1845, as Dr. O'Toole in "The Irish Tutor"; joint manager of the Arch Street Theater, Philadelphia, after 1853; played in England and Australia as well as in the U. S.; had few equals as an Irish comedian; married Mrs. Louisa Lane Mossop, an English actress noted in high comedy parts. Their son John, 1853– ; made his first appearance in Philadelphia, 1872; played Shakespearean rôles with Edwin Booth; became a member of Augustin Daly's Company, playing in Shakesperean, Sheridanian, and other classical rôles, and creating many parts in original plays; made his appearance as a star, 1892, in "The Masked Ball."

Dreyfus (drā-fūs'), **Alfred**, 1859– ; French military officer; b. Mulhouse, Alsace; entered the Polytechnic School in Paris, 1878, the School of Application, Fontainebleau, 1880, and the artillery branch of the army, 1882; commissioned captain, 1889; entered the School for Staff Officers, 1890, and the Intelligence Bureau of the General Staff, 1893. In 1894 he was arrested, charged with selling military secrets to Germany; tried by court martial; convicted; publicly degraded (January 5, 1895) in the presence of 5,000 troops; and confined on Devil's Island till 1899, when the French Senate voted a revision of his case. He was retried and reconvicted, but the proceedings developed such a scandalous state of affairs in the general staff that the government volunteered a pardon. In 1900 he again begged a rehearing, but his request was denied. He continued to reiterate his innocence, published "Five Years of My Life," 1901, and finally his friends brought his case up to the Court of Cassation, which, July 12, 1906, annulled his condemnation. On this vindication he was restored to the army on the scene of his degradation, and promoted to major.

Dreyse (drī'zĕ), **Johann Nikolaus** von, 1787–1867; German inventor; b. Sömmerda, Prussia; son of a locksmith; worked in a Paris gun factory, 1809–14; after his return to Germany established an ironware factory in Sömmerda, and devoted his attention chiefly to the improvement of firearms; perfected the needle gun, 1836, and established an extensive gun and ammunition factory, 1841.

Drift, term applied to bowlder clay and collections of stones and earth formed in the Pleistocene period through the agency of glaciers. Some geologists limit the term "drift" to material that has been recently moved by water, including sands, marls, and gravels, stratified and unstratified. Such deposits are sometimes

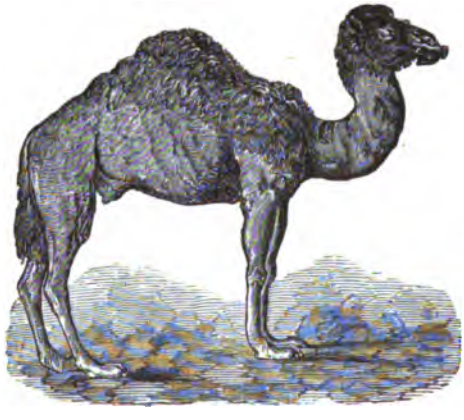
called "diluvium." They contain remains of animals that have recently inhabited the earth, including some extinct species. Human remains have been found in these deposits in such quantity as to make it probable that the human race existed contemporaneously with the elephants, rhinoceroses, and gigantic deer of the Pleistocene period.

Drill (mechanics). See BLASTING.

Drill (zoölogy). See BABOON.

Drogheda (drŏ'khĕ-dä), seaport of Leinster, Ireland; on the boundary between the counties of Louth and Meath, and on the Boyne, 4 m. from its entrance into the sea, and 25 m. N. of Dublin; has a Roman Catholic cathedral, several convents, a customhouse, and manufactures of cotton and linen fabrics, steam engines, etc.; grain, cattle, linen, hides, butter, and ale are exported. Drogheda was formerly a town of great importance, and the chief military station of Leinster from the fourteenth to the seventeenth century, but it is, above all, noted as the place of a massacre by Cromwell in 1649.

Drom'edary, Arabian and African camel, differing from the Bactrian camel in having only one hump on the back. It has also more slenderness and symmetry of form. Its usual



DROMEDARY.

pace is a trot, which it often maintains for hours together at the rate of 9 m. an hour. The dromedary surpasses other camels in speed, and can travel several days without drink. It is extensively used as a beast of burden in Africa and Arabia. See CAMEL.

Dront'heim. See TRONDHJEM.

Drop'sy, condition characterized by excess of the natural fluid in any of the serous cavities or in the loose tissue of the human body; is a symptom of many diseases, caused for the most part by disturbances of the circulation of the blood. If the cerebro-spinal fluid be increased, it constitutes *hydrocephalus,* or "water on the brain." If the excessive secretion (exudation) takes place from the pleura, it is called *hydrothorax,* or "dropsy of the chest." If the fluid collect in the abdominal cavity, the disease is called ascites.

Dros'era, genus of perennial herbaceous plants of the family *Droseraceæ,* popularly called sundew, several species of which are natives of the U. S. and of the United Kingdom. From the glands of the leaves exude drops of a clear fluid glittering like dewdrops; hence the name. When flies or other small insects light upon a leaf they are held by the sticky fluid of the glands; the leaves then roll down from the apex and eventually surround the insect. It is pretty certain that the insect is digested and absorbed by the leaf.

Drouet (drō-ā'), **Jean Baptiste** (Comte d'Erlon), 1765–1844; French military officer; b. Rheims; fought in the campaigns of 1793–96; general of brigade, 1799; decided the victory at Jena, 1806; conspicuous at Friedland, and in the Peninsular War; on Napoleon's return from Elba captured and held the fortress of Lille for him, and was made a peer; commanded the First Army Corps in the campaign ending at Waterloo, and the Army of Vendée, 1832; Governor General of Algiers, 1834–35; raised to rank of marshal, 1843.

Drouyn de Lhuys (drō-ăn' dė lwē'), **Édouard,** 1805–81; French statesman; b. Paris; director of the Commercial Bureau in the Ministry of Foreign Affairs, 1840–45; Minister of Foreign Affairs, 1848–49, 1852–55, 1862–66; minister to England, 1849.

Drown'ing, death produced by suffocation under water. The period during which the submersion may continue without death varies. In some instances bodies submerged but a minute were dead in spite of all attempts at restoration, while many cases are on record in which recovery has taken place after five minutes' submersion. The explanation of recovery after prolonged submersion has been sought in the occurrence of fainting at the moment of the fall, and it is certain that during syncope the demand for air is very much diminished. When the body is recovered after a short immersion, efforts for resuscitation should be made immediately, and perseveringly continued till recovery takes place or the case is evidently hopeless. The rules of Dr. Marshall Hall are: (1) Clear the throat by placing the patient on the face, slightly raising the head, so that the fluids may run out; (2) excite respiration by applying irritants to the nostrils, dashing cold water on the face, previously rubbed briskly till it is warm, and on failure of these means rolling the body gently from the face to the side and back again, fifteen times a minute, with equable and efficient pressure on the spine in the intervals; (3) induce circulation and warmth by friction and dry clothing; (4) excite inspiration by slapping the surface of the chest briskly with the hand, and dashing cold water on it after it has been made warm and dry. Cases are reported where artificial respiration had to be kept up for hours before signs of life returned.

Droysen (droi'zĕn), **Johann Gustav,** 1808–84; German historian and philologist; b. Trep-

tow, near Berlin; professor at Berlin, 1835–39, 1859–84; works include "History of Alexander the Great," "History of Prussian Politics."

Droz (drōz), **Pierre Jacquet,** 1721–90; Swiss inventor; was a watchmaker at La Chaux de Fond; invented the musical clock, a compensating pendulum of two metals, and a writing automaton. His son, Henry Louis Jacquet (1752–91), constructed an automaton representing a female playing a harpsichord and rising and bowing to the audience; also a famous pair of artificial hands.

Dru'ids, priests of the ancient Celtic religion. In Cæsar's time they formed an exclusive class, which shared with the nobility and the knights the rule over the people. They presided at the sacrifices, instructed the youth, and guarded the secret doctrines of religion; acted as judges in the difficulties between different tribes, and exercised the arts of prophecy and religious minstrelsy; were skilled in medicine, in astrology, the division of time, and other branches of knowledge, which were kept secret from the masses of the people. They recognized a ruling destiny and the immortality of the soul, and reverenced the oak and mistletoe as sacred. Their political importance ceased on the subjection of Gaul and Britain to the Romans, and their religious service was abolished by a decree of the Emperor Claudius because of its feature of human sacrifices. There were also druidesses of several ranks. Of the druidical doctrines little is known.

Druids, Uni'ted An'cient Or'der of, secret fraternal and beneficial association, founded in London, 1781; originally intended for the mere mutual entertainment of its members; adopted a system of ceremonies similar to that of the Freemasons, but professedly based on traditions handed down from the ancient Druids. As the society extended, many changes were introduced, and the original organization in time was divided into a great number of independent orders. The branch in the U. S. was founded in 1839, and during 1847–1908 dispersed $6,267,371 in benefits.

Drum, an instrument, consisting of a hollow cylinder of wood or metal having skin or parchment stretched across one or both ends, on which the drummer beats. The military drum is used to give signals, as well as for music. There are three kinds of drums—the side drum, the "big" or bass drum, and the kettledrum. The first is suspended at the side of the drummer, who beats on one end of it only. Strings of catgut, called snares, are stretched across the other end; hence it is often called a snare drum. The bass drum is beaten on both ends. The kettledrum is of hemispherical form, and has but one head or parchment. In architecture, a drum is the upright part of a cupola below the carving or rounded part. The solid part or vase of a Corinthian or composite capital beneath the acanthus leaves is also called a drum, though more often a bell. The term "drum" is applied in machinery to a hollow cylinder fixed upon a shaft for the purpose of driving another cylinder by a band. Drum is also a name given in the eighteenth century to a crowded fashionable assembly, so styled, "from the noise and emptiness of the entertainment." A large assembly of the kind was called a "drum major." The name "kettledrum" applied to an informal afternoon reception appears to have originated in the nineteenth century.

Drum'lin, smooth oval hill composed of till or bowlder clay. The contours and profiles of drumlins are smooth curves, attributed to glacier modeling. Their tops are rounded; their sides are often steep, but merge gradually



DRUMLIN.

with surrounding surfaces. Where the hills are grouped together, the groups frequently constitute belts running parallel to neighboring terminal moraines. In the U. S. they are especially abundant in New England, W. central New York, and E. Wisconsin.

Drum'mond, Henry, 1851–97; Scottish writer and theologian; b. Stirling; in 1877 became Prof. Extraordinary, and, 1884, Prof. of Natural Science in the Free Church College, Glasgow; in 1883–84, engaged in exploration in central Africa; lectured on religious, scientific, and sociological subjects in Great Britain, the U. S., Canada, and other English-speaking countries; published "Natural Law in the Spiritual World," "Tropical Africa," "The Ascent of Man," and several widely read minor religious works, mostly collected in "The Greatest Thing in the World, and Other Addresses."

Drummond, Thomas, 1797–1840; Scottish engineer; b. Edinburgh; one of the royal military engineers. In 1825, while employed in the trigonometrical survey of Scotland, he made successful experiments with incandescent lime to render distant objects visible, and perfected the Drummond Light (*q.v.*).

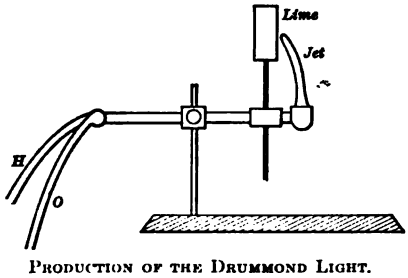
Drummond, William, 1585–1649; Scottish poet; b. Hawthornden, near Edinburgh, passed his life in retirement and in literary pursuits. In 1619 Ben Jonson traveled several hundred

miles in order to visit Drummond, who wrote "Notes of Ben Jonson's Conversation" on this occasion. He was author of "Tears on the Death of Mæliades," "Poems," "Forth Feasting," "History of the Five Jameses," and some political tracts.

Drummond, William Henry, M.D., 1854–1907; Canadian physician and poet; b. Scotland; educated Montreal High School, McGill and Bishop's univs., Montreal; graduated in medicine, 1884; practiced in small community in province of Quebec, whose population consisted of Indians, Scotch-Irish Canadians, French habitants, and English; obtained here material for unusual poetry written in habitant dialect; published "The Habitant," "Johnny Courteau," and other dialect verse; later Prof. of Medical Jurisprudence in Bishop's Univ.

Drummond Is'land, in Lake Huron; the westernmost of the Manitoulin group; belongs to Michigan; is 20 m. long and 10 m. wide.

Drummond Light, also called LIME LIGHT, CALCIUM LIGHT, etc., intense light produced by throwing the oxyhydrogen blowpipe flame upon a pencil of lime, thereby raised to vivid incandescence. If magnesia or metallic magnesium be used instead of lime, the light is rich in actinic rays, and hence is useful in photography. Zirconia is often employed instead of lime, on account of its nonvolatility.



PRODUCTION OF THE DRUMMOND LIGHT.

Drunk'enness. See ALCOHOL, PHYSIOLOGICAL EFFECTS OF.

Drupe, in botany, a one-celled, superior unsplit fruit, having a single seed or kernel, usually inclosed in a hard and bony *endocarp* called a stone, as a peach or a plum. The outer part of the fruit, which is succulent or fleshy, is called the *sarcocarp* or *mesocarp*. The term *putamen* is applied to the hard, stony substance which incloses the kernel.

Dru'ses, people of mixed race (largely Persian and Arab), almost limited to the Lebanon, and the Hauran, speaking Arabic, and numbering nearly 90,000; are industrious and hospitable, but revengeful and cruel, and are celebrated for their conflicts with the Maronites. Their chief business is the production of silk. For about 800 years they have maintained a distinct religion and a separate nationality. Their creed is an offshoot of Mohammedanism; in some of its fundamental tenets, however, it seems to approach Christianity. "There is no god but God," the Druses say, and he is unknowable to man, but he becomes known to man through revelation; and then follows a doctrine of incarnation not altogether unlike the Christian doctrine, but an abomination to all Mohammedans. The highest, and also the last, of these incarnations was, according to the Druses, that of Hakim Bramrillahi, the sixth of the Fatimites, caliph during 1019–44. They derive the name Druses from Ismael Darasi, a Persian, who was their first apostle in Syria, though the only name they acknowledge is *Muahidins* (Unitarians).

Dru'sus, surname of several important Romans. CLAUDIUS NERO, 39–9 B.C., was Roman general; son of Tiberius Nero and Livia, and a younger brother of the Emperor Tiberius; married Antonia, a daughter of Mark Antony; in 13 B.C., defeated the Germans near the Rhine; having conquered the Sicambri and Frisii, he extended the Roman Empire to the German Ocean and to the Elbe; for this conquest, he received the surname of Germanicus; left sons, Germanicus and Claudius, the latter of whom became emperor. MARCUS LIVIUS, Roman orator and politician; became tribune, 122 B.C., as a colleague of Caius Gracchus; supported the cause of the Senate and the Optimates, opposed the policy of Gracchus, and gained popularity by planting colonies; elected consul for 112 B.C. MARCUS LIVIUS, d. 91 B.C.; was a son of Marcus Livius Drusus and uncle of Cato Uticensis; having been chosen tribune of the people for 91 B.C., he courted the popular favor by passing an agrarian law; unable to win the support of the Senate, he attempted to gain the support of the colonies by promising them citizenship; was assassinated by a political opponent.

Dry'ads, in Greek and Roman mythology, wood nymphs; generally considered the same as the hamadryads; their life was confined to the trees in which they lived.

Dry'den, John, 1631–1700; English poet; b. Aldwinckle, Northampton; became a resident of London; originally a Parliamentarian, but joined the Royalists, and in 1686 was converted to Roman Catholicism; poet laureate and historiographer royal, 1670–88; wrote "Heroic Stanzas on the Death of Cromwell," "Astræa Dux," celebrating the restoration of Charles II; "Ode for Saint Cecilia's Day," "The Hind and the Panther," announcing his conversion; "Absalom and Achitophel," a poetical and political satire; comedies and tragedies, including "The Wild Gallant," "Marriage à la Mode," and "Aurungzebe"; a prose "Essay on Dramatic Poesy," etc. He translated into English rhymed couplets the works of Vergil, and was a leader in creating modern English prose.

Dry Dock. See DOCKS AND DOCKYARDS.

Dry Rot, popular term used to designate the slow decay of wood after it has been dried or seasoned. The term is used technically to distinguish the work of certain fungi. Wood which is thoroughly well seasoned and is protected from dampness by paint or other means is secure from the injuries of the dry-rot fungi. Among horticulturists dry rot is the slow de-

cay of the heart wood of fruit trees, due to various toadstool and punk fungi, which gain an entrance through some wound or break in the surface of the trunk.

Dry Tortu'gas, group of ten small, low, barren islands, belonging to Monroe Co., Fla., 40 m. W. of the westernmost of the Florida Keys proper. Fort Jefferson is an important fortification on Garden Key. The Dry Tortugas served as a place of imprisonment for persons under sentence by courts-martial during the Civil War, 1861–65.

Du'alin, explosive compound introduced in 1868 by Dittmar; composed of nitroglycerin mixed with sawdust, or wood pulp such as is used in paper mills; the latter being first treated with nitric and sulphuric acids. The object of the mixture is to diminish the danger connected with the storage and transportation of nitroglycerin.

Du'alism, in metaphysics, the doctrine that the universe exists by the concurrence of two principles, the spiritual and the material, each necessarily independent and eternal. The "dualism" of Zoroaster belongs rather to religion than to philosophy. It assumed two independent principles—one good, the other evil—through the collision of which was explained the disorder, moral and physical, of the world. The Gnostics in the second century adopted these views in a greater or less degree. The Greek philosophers are called dualists, as most of them held that matter and spirit were each self-existent and independent in origin. In connection with theories of perception the term dualism has been used to denote the soul and the modes of matter in relation and opposition to it while the mind is in the act of acquiring knowledge of external things. See MONISM.

Duane', James Chatham, 1824–97; American military officer; b. at Schenectady, N. Y.; graduated at West Point in 1848; served throughout the Civil War, taking part in many engagements; received the brevet rank of colonel for services in the Richmond campaign, and of brigadier general for gallantry and skill displayed in the siege of Petersburg and afterwards. He served in the construction of the defenses of the E. entrance to New York harbor, 1865–68; became lighthouse engineer of the NE. Atlantic coast, and superintendent of the fortifications at Maine and New Hampshire. In 1886 he became chief of engineers, with rank of brigadier general; retired 1888. He was commissioner of the Croton aqueduct, New York, from August 1, 1888, till his death.

Duane, William John, 1780–1865; Irish-American lawyer; b. Clonmel, Ireland; practiced law in Philadelphia, and published, besides other works, "The Law of Nations Investigated in a Popular Manner"; Secretary of the Treasury of the U. S., 1833, but was soon dismissed by President Jackson, because he refused to remove the deposits of public money from the Bank of the U. S.

Duban (dü-bäṅ'), **Jacques Félix,** 1797–1870; French architect; b. Paris; completed the Palace of Fine Arts, embellished the Louvre, restored Sainte Chapelle and the chateau of Blois, and was inspector general of public buildings.

Du Barry', Jeanne Bécu (Comtesse), 1746–93; mistress of Louis XV; b. Vaucouleurs; went to Paris as a dressmaker; married to Guillaume, Comte Du Barry; became the favorite of the king, and with her confidant, the Duc d'Aiguillon, controlled the policy of the government; is said to have used 35,000,000 fr. to gratify her vanity and advance the interests of her family; was a liberal patron of artists and men of letters; banished from court on the death of the king; condemned on various charges, including that of squandering the public treasures, 1793, and was guillotined.

Du Bartas (dü bär-tä'), **Guillaume Salluste,** 1544–90; French poet; b. Montfort; undertook various diplomatic missions for the Huguenot cause; fought in the Huguenot army, and died from a wound in the battle of Ivry. His fame rests on two epic poems, entitled "La Sepmaine" (The Week) and "La Seconde Sepmaine." The first describes the creation of the world; the second, the period from the creation to the incarnation of Christ.

Du Bellay'. See BELLAY.

Dub'lin, capital of Ireland and of Dublin Co.; on the Liffey, at its entrance into Dublin Bay; 66 m. W. of Holyhead. The river divides the city into two nearly equal parts, which are connected by nine bridges. In the NE. and SE. parts are many beautiful squares, streets, and terraces. The city is surrounded by the Circular Road, 9 m. long, which is a favorite drive and promenade. The most imposing street is Sackville Street, 120 ft. wide and 700 yds. long. Among the numerous squares is Stephen's Green. The chief public buildings are the Bank of Ireland (formerly the Parliament House), Trinity College, the customhouse, the Four Courts, Dublin Castle, occupied by the lord lieutenant; St. George's Church, and St. Patrick's Cathedral. Among the literary and scientific institutions are Dublin Univ., Royal College of Science, the Roman Catholic Univ., the College of Surgeons, Royal Dublin Society, Royal Irish Academy, Hibernian Academy for Paintings, and the National Gallery. Dublin is the seat of a Protestant Episcopal and a Roman Catholic archbishop. The city has glass works, foundries, distilleries, and manufactures of poplin, which are much celebrated.

Dublin was taken in the ninth century by the Danes, and, though they were several times expelled, and completely defeated in the battle of Clontarf, they managed to hold the city until 1170. In 1172 Henry II landed in Ireland at the head of an Anglo-Norman armament. He went to Dublin, held his court there with great magnificence, and made an alliance with the Irish chiefs. In 1689 James II took up his residence in Dublin, and held a parliament there. An Irish International Exhibition was held here, 1907. Pop. (1901) 290,638.

Dublin, Univer'sity of (otherwise called TRINITY COLLEGE, DUBLIN), institution of learning, said to have been founded 1320; reëstablished,

1593, by Queen Elizabeth; endowed by the corporation of Dublin and by private gifts, and still further by grants of James I, who in 1613 gave it representation in Parliament, which it still possesses. In 1873 an unsuccessful attempt in the British Parliament to unite the Catholic Univ., Magee College, Belfast, and Queen's Colleges at Cork and Belfast to the Univ. of Dublin, and to abolish Queen's College at Galway, led to the temporary disruption of the Gladstone Ministry.

Dubois (dü-bwä), **Guillaume,** 1656–1723; French ecclesiastic and politician; b. Brives-la-Gaillarde; appointed a Councilor of State, 1715; exhibited much political cunning and talent for intrigue. Among his important diplomatic acts was the treaty between France, England, and Holland, called the Triple Alliance (1717). He became abt. 1718 Minister of Foreign Affairs, and, though his morals were depraved, Archbishop of Cambray, 1720, and Cardinal, 1721; Prime Minister, 1722, and retained power until his death.

Dubois, Paul, 1829–1905; French sculptor and portrait painter; b. Nogent-sur-Seine; one of the greatest artists of the French school; received the highest honors at exhibitions in Paris and elsewhere for sculpture and painting. Among his finest works in sculpture are "The Child St. John," the four figures for the tomb of Gen. de la Moricière at Nantes, "Narcissus," and "Jeanne d'Arc."

Du Bois-Reymond (-rā-mōn'), **Emil,** 1818–97; German physiologist; b. Berlin; succeeded his teacher, Johannes Müller, as Prof. of Physiology at Berlin Univ.; member of the Academy of Sciences and (1867) its secretary; widely known for his researches in animal electricity.

Dubufe (dü-büf'), **Claude Marie,** 1790–1864; French genre and portrait painter; b. Paris; followed the classical style; his "The Surprise" is in the National Gallery, London.

Dubufe, Édouard, 1820–83; French figure and portrait painter; b. Paris; son of the preceding; officer Legion of Honor, 1869; his "The Congress of Paris" is in the Versailles Museum.

Dubufe, Édouard Marie Guillaume, 1853– ; French figure and portrait painter; b. Paris; son of the preceding. Among his important works are "St. Cecilia" and "Sacred Music and Profane Music." He painted the ceiling in the public foyer of the Théâtre Français, Paris.

Dubuque (dō-bük'), capital of Dubuque Co., Iowa; on the Mississippi, and opposite the point where the boundary line between Wisconsin and Illinois reaches the river; 165 m. NW. of Chicago; built partly on a terrace and partly on bluffs, which rise 200 ft.; lower part of city is chiefly devoted to business. Chief industries are meat packing, shipbuilding, and manufactures of lumber, malt liquors, carriages and wagons, foundry and machine-shop products, waterworks appliances, and lead and zinc articles. Dubuque is the commercial center of the great lead region of Iowa, NW. Illinois, and SW. Wisconsin, some of the mines being within the city limits. There is a harbor set apart by the U. S. Govt. for the wintering of boats. Dubuque is the oldest settlement in the state. Julien Dubuque, a French-Canadian trader, came here to work the lead mines in 1788, but the permanent settlement dates only from 1833. Pop. (1906) 43,070.

Duc (dük), **Joseph Lewis,** 1802–79; French architect; b. Paris; with Alavoine built the Column of July, and with Dommey, the Palace of Justice; won Napoleon III's prize of 100,000 fr. for the greatest artistic production within five years, 1864; and with part of it founded an annual academical prize for the encouragement of architecture.

Du Camp (dü kăn'), **Maxime,** 1822–94; French author; b. Paris; explored Egypt, Nubia, Palestine, and Asia Minor for the Ministry of Public Instruction, 1849–51; officer of the Legion of Honor, 1852; member of the French Academy, 1880; founder of the *Revue de Paris*, and a stockholder in the *Revue des Deux Mondes*; published many works on history, biography, archæology, poetry, and fiction; most important work, "Paris: Its Organs, Functions, and Life," etc., six volumes, 1869–75.

Du Cange (dü kănzh'), **Charles du Fresne,** 1610–88; French historical writer and lexicographer; b. Amiens; lived in Paris after 1668; works include "Histoire de l'Empire de Constantinople sous les Empereurs Français," "Glossarium ad Scriptores Mediæ et Infimæ Græcitatis," and "Glossarium ad Scriptores Mediæ et Infimæ Latinitatis."

Ducarel', Andrew Coltee, 1713–85; antiquary; b. Normandy; author of "Anglo-Norman Antiquities," "A Series of more than 200 of the Anglo-Gallic Coins of the Ancient Kings of England," and "The Histories and Antiquities of the Archiepiscopal Palace at Lambeth."

Ducasse (dü-käs'), **Jean Baptiste,** abt. 1640–1715; French naval officer and administrator; b. Berne; became a partner in the Senegal Company and actively engaged in the slave trade; Governor of the French colony in Santo Domingo, 1691; attacked the English at Jamaica, and reduced that island almost to ruin, 1694; commanded the land forces in an expedition which sacked Cartagena, 1697. In 1701, commander of a Spanish fleet, and had a running fight of four days with the English squadron of Benbow; served in Spain during the War of the Spanish Succession, becoming lieutenant general; commanded the naval forces in the attack on Barcelona, 1714.

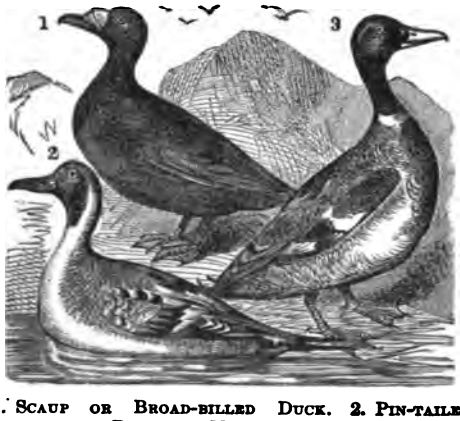
Duc'at, gold coin that originated in Italy and was afterwards coined in several countries of Europe. In 1559 the ducat was adopted as a legal coin of the German Empire. There was much difference in the value of the ducats which circulated in various countries. Those of Austria, Holland, and Hamburg are nearly equivalent to two U. S. gold dollars. The Spanish silver ducat (*ducado*) is worth about one dollar.

Du Chaillu (dū shä-yū'), **Paul Belloni,** 1835–1903; Franco-American traveler; b. Paris; son of a French merchant in equatorial Africa; naturalized as a citizen of the U. S.; explored the Gaboon region, etc., and published, besides other works, "Explorations and Adventures in Equatorial Africa," "A Journey to Ashango Land," "My Apingi Kingdom," "Wild Life under the Equator," "The Country of the Dwarfs," "Land of the Midnight Sun," "Age of the Vikings," etc.; was the first white man to hunt the gorilla, 1856.

Duchesne (dū-shān'), **André,** 1584–1640; French historian; b. Touraine; geographer and historiographer to the king; chief work, "Ancient Historians of the Normans."

Ducis (dü-sē'), **Jean François,** 1733–1816; French poet; b. Versailles; devoted himself entirely to poetry; his tragedy, "Abufar," became celebrated, but he is best known from his having translated and arranged for the French stage "Hamlet," "Romeo and Juliet," "Lear," "Macbeth," "King John," and "Othello."

Duck, popular name for many waterfowl typified by the common duck, *Anas boscas.* In a general way ducks are distinguished from geese on the one hand and the mergansers on the other by a broad, flattened bill, short legs, and scaled shanks or tarsi. There are about 150 species, grouped in two subfamilies, the river ducks and sea ducks; the former without, the latter with a flap or lobe on the hind toe.



1. Scaup or Broad-billed Duck. 2. Pin-tailed Duck. 3. Mallard Duck.

There are ducks in nearly all parts of the globe, the species being most numerous in warm regions, the individuals in cold climates. The species inhabiting the temperate zones usually migrate N. or S. (according to the hemisphere they reside in) in spring to their breeding places, while in winter they assemble in vast flocks.

Ducks seem to have been domesticated at a comparatively recent date, for they were unknown to the Egyptians, and Roman writers of the first century speak of the necessity of keeping them covered with netting to prevent their escape. The mandarin duck of China, a near relative of the summer duck of the U. S., is regarded in China as an emblem of conjugal affection. See Eider Duck.

Duck'bill, or Wa'ter Mole, a monotrematous mammal of Tasmania and Australia. It deviates less from the birds than any other mammals except the *Tachyglossidæ.* The duckbill is the only animal of its genus. It is about 15 in. long, with a brown fur. It has a sort of horny tooth near the base of each jaw, and the males have spurs on the hind legs. The female has no nipple, but the young (which are hatched from eggs and are at first very slightly developed) draw their milk through a slitlike opening. This animal inhabits ponds and quiet streams, where it swims about on the surface of the water with its head somewhat elevated, often diving for its food, which consists of insects and other small aquatic animals. It climbs trees, and is sometimes seen in small groups on the limbs of trees near the water. It digs a burrow, often 30 ft. long, in the river bank, with one opening above and another below water. This burrow is projected in a serpentine course into the bank, and ascends toward its end, where is built the nest of dried grasses, leaves, weeds, etc.

Duck'ing Stool. See Cucking Stool.

Duck Riv'er, in Tennessee; rises in Coffee Co.; flows W. through middle Tennessee, and enters the Tennessee River in Humphries Co.; length about 250 m.

Duck'weed, a small and usually floating plant, with unisexual flowers, without calyx or corolla, and with loose hanging roots. The duckweeds belong to the family *Lemnaceæ,* and are related to the arums. They are widely distributed over the world, and several species are found in the U. S., covering the surface of stagnant waters with their flat green fronds.

Duclerc (dü klärk'), **Charles Théodore Eugène,** 1812–88; French statesman; b. Bagnères-de-Bigorre; editor of *Le Bon Sens,* Paris; on staff of the *National,* 1840–46; as representative to the National Assembly from the Landes and Basses-Pyrénées, led the Republican Left; elected Vice President of the Assembly, 1875, and Senator for life; Premier, 1882–83.

Duclos (dü-klō'), **Charles Pineau,** 1704–72; French author; b. Dinan; wrote several successful romances; admitted into the French Academy, 1747; historiographer of France, 1753; chief works, "Reflections on the Manners of this Century," and "Secret Memoirs of the Reigns of Louis XIV and XV."

Ductil'ity, capability of being drawn out into a long and slender form. The metals having the greatest ductility are gold, silver, platinum, aluminium, and iron. A grain of gold may be drawn into 500 ft. of wire, and a wire of platinum not exceeding a thirty-thousandth of an inch in diameter has been obtained by placing a fine wire of platinum in the axis of a larger silver wire, then drawing the compound wire in the usual way, and finally dis-

solving the silver by nitric acid. The ductility of glass (when melted or heated to a red heat) is almost unlimited.

Du Deffand (dü dĕf-fän') (Marquise). See DEFFAND.

Dudevant (dü-dĕ-vän') (Madame). See SAND, GEORGE.

Dud'ley, Thomas, 1576–1653; American executive; b. Northampton, England; served in Holland in Queen Elizabeth's army; in 1630 went to Boston as Deputy Governor of Massachusetts Bay under Governor John Winthrop; held that office twelve years, and was Governor in 1634, 1640, 1645, and 1650; became major general in 1644.

Du'el, originally a trial by battle resorted to by two individuals, either to determine the guilt or innocence of a person charged with a crime, or of deciding a disputed right; in more recent times a hostile meeting between two persons in consequence of an affront given by one to the other, and to afford satisfaction to the injured party. This mode of deciding private differences seems to have originated with the feudal system. The appeal to arms as an alternative for the trial by ordeal was first elevated to the dignity of an established institution by Philip the Fair of France, 1306. In England dueling does not appear to have prevailed until the latter part of the reign of Elizabeth. In England a challenge to fight is now a high misdemeanor, and since 1844 dueling in the army has been an offense punishable by cashiering.

The public or judicial combat was prohibited in France by Henry II, 1547, but private duels continued, and in the reign of Henry IV, it is asserted, 4,000 fell in two years. Since 1848 duels have greatly diminished in France; killing in this way is now punishable as homicide, and a civil action lies on behalf of the friends of the man killed. In no country were duels more prevalent formerly than in Ireland. In Scotland, as late as the middle of the sixteenth century, licenses for dueling were granted by the Crown. In German universities nearly every student belongs to a "corps," as a member of which he is bound to quarrel with some one. The duels, fought with *schlägers*, long, double-edged weapons, seldom result seriously, but leave ugly scars on the face (the only part of the body not protected), of which the bearers are proud. In the U. S. dueling was formerly common, but in recent times it is rarely heard of. It is not only made illegal by statute, but is forbidden in the army and navy by the Articles of War.

Duen'na, chief lady in waiting on the queen of Spain; in a more general sense a woman holding a middle station between a governess and a companion, and appointed to take charge of young ladies.

Du'ero. See DOURO.

Dufaure (dü-fōr'), **Jules Armand Stanislas,** 1798–1881; French statesman; b. Saujon; practiced law at Bordeaux; elected to the Chamber of Deputies, 1834; became a leader of the Liberal party. After the formation of the republic (1848) he was a Moderate Republican member of the Assembly; became Minister of the Interior; was driven from the public service by the *coup d'état* of 1851, after which he gained great eminence at the bar; appointed Minister of Justice, 1871.

Dufay (dü-fā'), **Charles François de Cisternay,** 1698–1739; French scientist; b. Paris; was the author of the theory of two kinds of electricity, vitreous and resinous, and wrote treatises on chemistry and other sciences.

Duf'ferin and A'va, Frederick Temple Hamilton Blackwood (Marquis of), 1826–1902; British diplomatist; b. Florence, Italy; succeeded to his title, 1841; Under Secretary of State for India, 1864–66; Chancellor of the Duchy of Lancaster, 1868; created a British earl, 1871; Governor General of Canada, 1872–78; British Ambassador at St. Petersburg, 1879; transferred to Constantinople, 1881; Viceroy of India, 1884; British Ambassador at Rome, 1888; created Marquis of Dufferin and Ava the same year; British Ambassador at Paris, 1891–96; elected president of the Royal Geographical Society, 1878; published "Letters from High Latitudes," "Contributions to an Inquiry into the State of Ireland," "Speeches in India," etc.

Duf'field, Samuel Augustus Willoughby, 1843–87; American Presbyterian clergyman and religious poet; b. Brooklyn, N. Y.; graduated at Yale, 1863; from 1882 preached at Bloomfield, N. J.; chief works, "Warp and Woof," 1870; "English Hymns, their Authors and History," 1886; and "Latin Hymn-writers and their Hymns" (posthumous).

Duf'fy, Sir Charles Gavan, 1816–1903; British statesman; b. Monaghan, Ireland; edited a journal in Dublin and then in Belfast; founder of the *Nation*, which became the organ of the Young Ireland party; tried and convicted of sedition with O'Connell, but the House of Lords quashed the conviction on appeal; again tried with the leaders of the Young Ireland party in 1848 for treason-felony, but acquitted; member of Parliament from New Ross, 1852–56; emigrated to Australia, where he filled important offices in Victoria, becoming in 1871 Prime Minister of the colony.

Du'gong, marine animal of the genus *Halicore*, belonging to the *Sirenia*. The dugong of the Australian seas is about 8 ft. long. The upper lip is thick and fleshy, and forms a kind of snout; the upper jaw bends downward almost at a right angle; the eyes are very small, with a nictitating membrane; the skin, thick and smooth. In its internal structure it has considerable resemblance to the pachyderms, and it feeds chiefly on *algæ*. The ventricles of the heart are entirely detached from each other. Its flesh is said to resemble beef, and is prized as food. The oil is recommended as a substitute for cod-liver oil, and there is a regular fishery for the dugong in Moreton Bay. The species inhabiting the Indian Ocean is *Halicore dugong*; that found in the Red Sea has been called *Halicore tabernaculi*.

Duguay-Trouin (dü-gā'-trō-ăn'), **René,** 1673–1736; French military and naval officer; b. St.

Malo; commanded a privateer, 1690–97; served with distinction in the War of the Spanish Succession, as captain in the royal navy; commanded a squadron in 1711, and with his troops sacked Rio de Janeiro; became lieutenant general in the army.

Du Guesclin (dü gä-klăń'), **Bertrand,** abt. 1314–80; French military officer; b. near Rennes; fought against the English, and defeated the Duke of Lancaster at Rennes, 1356; commanded an army which fought against Peter the Cruel of Castile, 1366; gained a victory, but was defeated and taken prisoner by the English "Black Prince," 1367; appointed Constable of France in 1369, he defended the country against the English invaders, whom he expelled from nearly every province before 1375.

Duil'lian Column, *Columna Rostrata* erected in the Forum at Rome to commemorate the victory of the consul Caius Duillius in the battle of Mylæ, 260 B.C., the first naval victory of the Romans over the Carthaginians. Columns of this kind were called *rostratæ*, from having the beaks of ships (*rostra*) projecting on each side.

Duisburg (dō'ĭs-bōrkh), free port of Rhenish Prussia; on the Ruhr and near the Rhine; 16 m. N. of Düsseldorf; has a church founded in 1187; a *gymnasium*, with a *realschule* and a high school for girls; also manufactures of cotton and woolens, hosiery, porcelain, soap, etc.; was a city of the Hanseatic League in the thirteenth century. Pop. (1906) 192,346.

Duke, title originally given in the Byzantine Empire to military governors of provinces, and previous to the time of Theodosius regarded as inferior to that of *comes* (count). Dukes in Germany became in course of time the chief princes of the empire. In France and Italy dukes form the second rank in the nobility, being next below princes; in England they are the first. The Austrian archdukes and the Russian grand dukes are princes of the blood. The princes of the royal house of Saxony also have the title of duke. In Bavaria and Württemberg the side branches of the reigning family are called "dukes in Bavaria" and "Dukes of Württemberg." Royal dukes in Great Britain are princes of the blood. British dukes have no territorial jurisdiction. The English dukes are, next to the peers of the royal blood and the archbishops of Canterbury and York, the first peers of the realm.

Dulcimer (dŭl'sĭm-mẽr), stringed musical instrument of ancient origin. Hebrew psaltery supposed to have been a kind of dulcimer. It is a flat box, usually trapezium shaped, which acts as a sounding board. On it are bridges bearing taut wires of various lengths, which are tuned by turning pegs at the side. The wires are set in vibration by striking them with small hammers. The dulcimer is said to have suggested the pianoforte.

Dulong (dü-lōń'), **Pierre Louis,** 1785–1838; French chemist; b. Rouen; discovered the chloride of nitrogen, 1812, and with Berzelius made a new analysis of water, revealing the inexactness of the former analysis, and investigated the formation of carbonic-acid gas. His chief distinction lies in his share in the discovery of the law that the capacity for heat of atoms is the same for all elements; it is known as Dulong and Petit's law.

Duluth', capital of St. Louis Co., Minn.; at the W. extremity of Lake Superior, 155 m. NNE. of St. Paul; is one of the E. termini of the N. Pacific Railroad, and the terminus of eight other railways. It has a customhouse, a weather-signal office, and some of the largest docks in the U. S. Among the noteworthy public buildings are the Opera House, the Board of Trade building, the State Normal School, St. Luke's Hospital, the Public Library, the Masonic Hall, and the Central High School, one of the finest public-school buildings in the U. S. The harbor, entered by a ship canal 250 ft. wide, is landlocked, being formed by Minnesota and Rice's Points; the former a scythe-shaped natural breakwater, running out 7 m. into the lake. Large quantities of wheat, flour, sheep, wool, hides, iron, copper and silver ore and bullion, are shipped from here, and the capacity of the elevators of the city aggregates 35,000,000 bushels. Duluth has large storage houses, stockyards, and shipyards; also blast furnaces, machine and car-building works, flour mills, lumber mills, and other manufactures. There are quarries of granite, sandstone, slate, and trap in the vicinity. The fisheries of Duluth are important. In May, 1869, the site of the city was a forest—the old Duluth was on Minnesota Point. It was named after Grecylon Du Lhut, an early French explorer of this region. The village of W. Duluth was annexed, 1894. Pop. (1906) 67,337.

Dumas (dü-mä'), surname of two noted French novelists. ALEXANDRE DAVY DUMAS, 1803–70; was born at Aisne; went to Paris to seek his fortune, 1823; produced "Henri III," a drama which was very successful, 1828; was a writer of the romantic school, remarkable for literary fecundity. His best-known novels are "The Three Musketeers" and "The Count of Monte Cristo." It appears that a large part of the works published in his name were written by other men. "Marriage under Louis XV" is still played with effect on all European stages. ALEXANDRE DUMAS, called the Younger, 1824–95, was a son of the above, and a celebrated poet, novelist, and dramatist; b. Paris; novels include "La Dame aux Camélias," dramatized as "Camille"; "Diane de Lys," "Henri de Navarre," "La Dame aux Perles"; his dramas, "Le Demi-monde," "Le Fils Naturel," "Monsieur Alphonse," "l'Étrangère," "Denise," "Un Père Prodigue"; other works, "L'Homme-Femme" and "Question du Divorce"; joint author of "Supplice d'une Femme," "Heloïse Paranquet," "Les Danicheff," etc.

Du Maurier (dü mō-rē-ā'), **George Louis Palmella Busson,** 1834–96; British artist and novelist of French descent; b. Paris; lived in France until he was seventeen; devoted himself mainly to black-and-white work, and especially to book illustration; was a contributor to

Punch from 1860 till his death; illustrated Thackeray's "Henry Esmond," though not in its original form; Douglas Jerrold's "Story of a Feather," and other books. His fame, however, rests on his novels, "Peter Ibbetsen," "Trilby," and "The Martian," especially "Trilby."

Dumb. See DEAF-MUTES.

Dumb'-bells, two weights of wood or iron connected by a bar which is grasped by the hand, and used in physical exercises for strengthening the muscles of the arms and chest. Most benefit is obtained by using the lighter weights below 5 lbs. each, though heavier dumb-bells are used for feats of strength. The record for lifting dumb-bells is 1,384 lbs. with the hands alone. One dumb-bell, weight 12 lbs., has been pushed 14,000 times from shoulder to full arm's length, while a 100-lb. dumb-bell has been similarly pushed twenty times. Weights like dumb-bells, called halters, were used in the ancient Grecian games.

Dumbar'ton, seaport of Scotland; capital of the county of same name; on the Leven near its entrance into the Clyde; 13 m. NW. of Glasgow; has manufactures of glass, machinery, and ropes, and shipbuilding is extensively carried on. Here, on a rock rising to the height of 560 ft., stands the famous Dumbarton Castle, which has been a stronghold for many centuries. Pop. (1901) 19,986.

Dum'dum, town of British India, in Bengal; 8 m. NE. of Calcutta. It was here that, in 1757, the ruler of Bengal made treaties with the British which have permitted the progress of the latter in E. India; and in 1857 this place was the scene of the first open resistance of the Sepoys to the use of greased cartridges. Pop. abt. 20,000.

The dumdum bullet, named for the arsenal at Dumdum, where it was first made, is one which is weakest at its point, and therefore flattens out upon striking a bone. It makes a very jagged wound and The Hague Peace Conference has agreed that dumdum bullets shall not be used in war.

Dumfries (dŭm'frēs), seaport of Scotland; capital of the county of same name; on the Nith; 9 m. from its entrance into Solway Firth, and 64 m. S. by W. from Edinburgh. Bridges connect it with Maxwelltown. The high tides of Solway Firth bring vessels of 60 tons to the town, and larger vessels to the river quays near Dumfries. Here are manufactures of woolen cloths (tweeds), hosiery, hats, etc. An infirmary and an asylum for lunatics are among the public institutions. Among the notable objects of the place is the tomb of Burns. Pop. (1901) 18,685.

Dumont (dü-mōn'), **Pierre Étienne Louis,** 1759–1829; Swiss scholar; b. Geneva; was a Protestant minister; spent much of his life in England; edited and popularized Bentham's works on legislation.

Dumont d'Urville (dür-vēl'), **Jules Sébastien César,** 1790–1842; French navigator; b. Condé-sur-Noireau; commanded an expedition which surveyed the coasts of New Zealand, New Guinea, etc.; in 1837 conducted an expedition to the Antarctic regions, and discovered land which he called Terre Adélir; returned in 1840 and became a rear admiral; published "Voyage of the Astrolabe," "Picturesque Voyage around the World," etc.

Dumouriez (dü-mōr-yā'), **Charles François,** 1739–1823; French military officer; b. Cambrai; served in the Seven Years' War as an officer; commandant at Cherbourg between 1776 and 1787; Minister of Foreign Affairs, 1792, resigning to take command of the army in the war with Austria; checked the allies in Maine; routed the Prussians at Valmy; invaded Flanders, 1792; defeated the Austrians at Jemappes, and conquered Belgium; was defeated at Neerwinden, 1793; accused of negotiating secretly with the Austrians and of plotting a counter revolution; fled to England, where he died.

Dü'na River. See DWINA.

Dunbar', Paul Laurence, 1872–1906; American poet; b. Dayton, Ohio; son of negroes who had been slaves; had a high-school education; lived in Richmond, Ind., for some years; published his first book, "Oak and Ivy," at the age of twenty; held a place in the Library of Congress, Washington, for several years; removed to New York, 1899; works include "Majors and Minors," "Lyrics of Lonely Life," "Lyrics of the Hearthside," "Poems of Cabin and Field"; also the novels, "The Uncalled," "The Sport of the Gods," "The Fanatics."

Dunbar, William, abt. 1460–1520; Scottish poet; b. Salton, Lothian; was a Franciscan friar and itinerant preacher in his youth; was employed by James IV as clerk of embassy; his most important works are "The Thistle and the Rose," 1503, and "The Dance of the Seven Deadly Sins." By many he is considered the greatest of Scottish poets.

Dunbar, royal burgh of Haddington, Scotland; at the mouth of the Firth of Forth; 27 m. ENE. of Edinburgh; has herring fisheries, and a harbor which will admit vessels of 300 tons; a fine old town, containing the remains of Dunbar Castle. Cromwell gained near this town a decisive victory over the Royalists, September 3, 1650.

Dunbar'ton, Scotland. See DUMBARTON.

Dun'can, Adam (Viscount Duncan of Camperdown), 1731–1804; British naval officer; b. Dundee, Scotland; entered the navy, 1746; with the rank of vice admiral was appointed commander of a fleet in the North Sea, 1795, and waged war against the Dutch; defeated them and captured eleven of their vessels near Camperdown, 1797; raised to the peerage for that service.

Dunciad (dŭn'sĭ-ăd), **The,** "the epic of the dunces," a satirical poem in which Alexander Pope replied to the literary underlings of Grub Street and other foes who had stung him in their lampoons. The first edition was published in 1728, and a final edition with "The New Dunciad," or fourth book, added in 1743.

Dunck'er, Maximilian Wolfgang, 1811–86; German historian; b. Berlin; Prof. of History at Halle, 1842; member of the National Assembly, 1848; professor at Tübingen, 1857; keeper of the Prussian Archives, 1861–75; works include "History of Antiquity" and "The Crisis of the Reformation."

Dundee', seaport of Forfar Co., Scotland; on the estuary of the Tay; 10 m. from the sea and 50 m. by water NNE. of Edinburgh; principal buildings the Royal Exchange, Corn Exchange, St. Paul's Church, an infirmary and the townhall, Albert Institute, and Kinnaird Hall. Here is a tower 156 ft. high, built in the twelfth century, to which three parochial churches under one roof have been annexed. Dundee has a university college, opened, 1883, a public library, an asylum for the insane, and is the chief seat in Great Britain of the manufacture of linen fabrics; has also manufactures of machinery, jute, flax, confectionery, and marmalades, and a number of tanneries and shipbuilding yards. It is the center of the whale- and seal-fishing trade of Great Britain; has a fine harbor and excellent docks. Dundee is a place of great antiquity, and was one of the residences of the Scottish kings; became a stronghold of Protestantism during the Reformation; burned by the Duke of Lancaster, 1385, and sacked and burned by Gen. Monk, 1651. Pop. (1905) 164,269.

Dune, hill of sand, heaped up by the wind. Dunes are found in various situations: (1) along coast lines, especially where the prevailing winds blow on shore; the sands delivered by the waves are carried out of their reach by the winds, forming hills often 100 or more ft. in height; such dunes are found along the shore of SW. France, where they have forced villages to retreat; their movement is much reduced by planting pine trees. Similar dunes occur on the sand bars or "beaches" that fringe the Atlantic coast of the U. S., and also on the SE. shore of Lake Michigan. (2) In desert regions where aridity excludes vegetation and allows the wind to carry about the fine products of rock disintegration. Extensive areas in the Sahara and in the deserts of Arabia, Persia, central Asia, W. N. America, etc., are covered by hills of drifting sand; their form is sometimes crescent, convex to the wind. (3) In relatively dry regions, as the W. plains of the U. S., dunes are frequently formed on the leeward banks of rivers, where the sand is blown from the river channel at low water.

Dune'din, capital of Otago and most important commercial center of New Zealand; at the head of Otago harbor, on the SE. coast of the Middle isle; contains many handsome churches and public buildings, botanic gardens, and manufactures of woolens. Here is the Univ. of Otago, affiliated with that of New Zealand. It is the seat of Anglican and Roman Catholic bishoprics. The chief export is wool. Pop. (1901) 52,390.

Dung'lison, Robley, 1798–1869; American physician; b. Keswick, England; Prof. of Medicine in the Univ. of Virginia, 1824–33; of Therapeutics in Univ. of Maryland, 1833–36; and of the Institutes of Medicine in the Jefferson Medical College, Philadelphia, 1836–68; most important publication, "Dictionary of Medical Science and Literature," 1833.

Dunkeld', town of Perthshire, Scotland; on the Tay; 15 m. NNW. of Perth. The cathedral, built on the site of an ancient Culdee monastery, was completed, 1501, several centuries after the foundation of Dunkeld, which had become the seat of a bishopric, 1127. Here is the mansion of the Duke of Athole, with the largest and finest park in Scotland, including 20 sq. m. of larch woods.

Dunk'ers, or Dunk'ards, sect of German Baptists, organized at Schwarzenau, Westphalia, 1708, with Alexander Mack as their first minister. Driven from Germany by persecution between 1719 and 1729, they settled in Pennsylvania, and later in Ohio, Indiana, Maryland, Virginia, and other states, and became divided into four branches: Conservative, Old Order, Progressive, and Seventh Day. In all they had (1908) 1,159 churches and 121,705 communicants. They practice trinal immersion at baptism, and the ordinances of feet washing and the kiss of peace are observed separately among the sexes. They enjoin plainness of dress, settle their difficulties without going to law, and avoid taking a prominent part in politics.

Dun'kirk (French DUNKERQUE), fortified seaport in the extreme N. of France; department of Nord, and on the Strait of Dover; about 40 m. NW. of Lille; is well built, with wide and well-paved streets, and is defended by a citadel and ramparts, near which is a recent monument of "Victory." The harbor is shallow, but the roadstead is large and safe. Dunkirk has several fine churches, a college, hydrographic institute, public library, townhall, foundries, salt refineries, and shipbuilding yards; also manufactures of linen, cotton, beet-root sugar, soap, starch, cordage, and leather, and important fisheries. It became a free port, 1826; since then has had an active trade in wines, liqueurs, etc. A church is said to have been built here in the seventh century among the sand hills or dunes, and hence its name, which signifies "church of the dunes." Dunkirk was burned by the English, 1388, and taken by them in 1658; sold to the French king by Charles II in 1662. Pop. (1901) 40,329.

Dun'lap, William, 1766–1839; American painter and writer; b. Perth Amboy, N. J.; paintings include "Christ Rejected" and "Calvary"; literary works include the plays "The Father," a comedy, acted, 1789, and "Leicester," the first American tragedy regularly produced; other works, "History of the Rise and Progress of the Arts of Design in the United States" and "History of the American Theater"; was a founder of the National Academy of Design.

Dun'mow, Great, market town of Essex, England, 10 m. W. of Braintree; considered by some the Roman Cæsaromagus. Little Dunmow, near by, contains the remains of an Au-

gustinian priory, founded 1104. Dunmow is best known by the "flitch of bacon" prize, bearing its name, instituted, 1244, by Robert Fitzwalter, on the condition "that whatever married couple will go to the priory, and kneeling on two sharp-pointed stones, will swear that they have not quarreled nor repented of their marriage within a year and a day after its celebration, shall receive a flitch of bacon." The prize was first claimed in 1445, two hundred years after it was instituted. Pop. abt. 3,000.

Dun'net Head, rocky peninsula of Caithness, Scotland, 100 to 600 ft. high; the extreme N. point of Great Britain; has a lighthouse 340 ft. above the sea.

Dunois (dü-nwä'), **Jean** (Comte de), called THE BASTARD OF ORLEANS, 1402–68; French general; b. Paris; natural son of Louis, Duke of Orleans, brother of Charles VI; after many brilliant exploits, held the city of Orleans till Joan of Arc came to relieve it; coöperated in her victories, especially at Patay; recovered Chartres; aided in expelling the English from Paris, 1436; drove them from Normandy and Guienne, 1449–51; and left them only the small district of Calais; the most prominent French soldier of the fifteenth century.

Duns Sco'tus, Joannes, surnamed THE SUBTLE DOCTOR; abt. 1265–1308; Scottish scholastic theologian; entered the Order of St. Francis; Prof. of Theology, first at Oxford, later at Paris; had a notable controversy with Thomas Aquinas, which was continued by their disciples, the Scotists and Thomists; he affirmed, against Aquinas, that the existence and nature of God cannot be proved by reason, but is known only through revelation; that the will is absolutely free; and that the faculties of the soul are not subjectively distinct from each other, but are constant modes of action of a unit of existence.

Dun'stan, Saint, 925–88; English prelate; b. Glastonbury; a man of extraordinary abilities, and gained renown by his ascetic piety; acquired the favor of Edred, who began to reign, 946 A.D., and took a prominent part in the government during his reign; banished by Edwy, 955, he obtained controlling power under Edgar, who became king in 959 and made Dunstan Archbishop of Canterbury.

Dun'ton, John, 1659–1733; English Dissenter; b. Graffham; wrote, beside other works, "The Life and Errors of John Dunton, with the Lives and Characters of a Thousand Persons," containing an account of a visit to Boston and Salem, and sketches of ministers and prominent citizens of New England in 1685.

Duodec'imal, term applied to an arithmetical scale using eleven digits and a cypher; also to a system of compound numbers used in calculating from measures taken in feet and inches.

Duode'num (from Latin *duodeni*, "twelve each," so named because in man it is about 12 finger breadths long), that part of the small intestine which is nearest the stomach. In man it is 8 or 10 in. in length. It is the widest, shortest, and most fixed part of the small intestine, having no mesentery. It is somewhat horseshoe-like in form, the convexity to the right. It receives the secretions of the liver and the pancreas. Its muscular fibers are more numerous than in the rest of the small intestine. See DIGESTION.

Dupanloup (dü-päṅ-lö'), **Félix Antoine Philibert,** 1802–78; French prelate; b. near Annecy, Savoy; ordained, 1825; confessor to the Comte de Chambord, 1827; catechist to the Orleans princes, 1828; and almoner to Madame la Dauphine, 1830, but retired from all these positions after the revolution of 1830, and was appointed superior of the diocesan seminary of Paris; became Bishop of Orleans, 1849; admitted to the French Academy, 1854; vigorously opposed the infallibility dogma, but accepted it, submitting to the decisions of the Council of the Vatican; nominated Archbishop of Paris, 1871, but declined.

Duperrey (dü-pär-rā'), **Louis Isidore,** 1786–1865; French hydrographer; b. Paris; conducted an exploring expedition, 1822–25, to the islands of the Pacific; surveyed the coasts of New Zealand and parts of Australia; determined accurately the positions of the magnetic poles and the figure of the magnetic equator.

Dupetit-Thouars (dü-pe-tē' tö-ärʳ'), **Abel Aubert,** 1793–1864; French vice admiral; b. Saumur; circumnavigated the globe, 1837–39; appointed commander of the French naval forces in the Pacific; established a French protectorate over Tahiti and the Marquesas Islands, 1842, and over all the Society Islands, 1843, acts that were disavowed by his government.

Dupin (dü-päṅ'), **Amantine Lucile Aurore.** See SAND, GEORGE.

Dupleix (dü-plā'), **Joseph,** Marquis, 1695–1763; French colonial governor. He amassed a fortune by commercial operations in India, and in 1742 was appointed Governor of Pondicherry and all the French possessions in India. He formed the project of founding a European empire in that country, and soon made himself master of the Carnatic, partly by fighting and partly by political intrigues. He was opposed by the British general Clive, who defeated the French in several battles. Dupleix was removed from the command in 1754, and returned to France, where he died.

Duponceau (dü-poṅ-sō'), **Pierre Étienne,** 1760–1844; Franco-American lawyer; b. St.-Martin, island of Rhé; came to the U. S., 1777; served as aid-de-camp to Baron Steuben; practiced law in Philadelphia; was president of the American Philosophical Society; published a work on Indian languages, 1838.

Du Pont, Henry, 1812–89; American military officer; b. near Wilmington, Del.; graduated at West Point, 1833; resigned, 1834, and became proprietor of the powder mills bearing his name near Wilmington, Del., which under his direction grew to immense size, and became an important factor in the Civil War. During the war served as major general in

command of the militia of the state, by his prompt and decisive action contributing largely to securing the state's allegiance to the Union.

Du Pont, Samuel Francis, 1803–65; American naval officer; b. Bergen Point, N. J.; entered the navy, 1815; in command of the *Cyane* on the W. coast of Mexico during the Mexican War; promoted captain in 1855, and in 1857 went on special service to China in command of the *Minnesota*; made flag officer in 1861; led the expedition that successfully attacked the fortifications of Port Royal, April 7, 1863; then made a brilliant but unsuccessful attempt to take Charleston.

Dupont de l'Étang (dü-pôṅ' dė lā-tāṅ'), **Pierre,** 1765–1838; French general; b. Chabannais; aided in the victory of Marengo; defeated a superior Austrian force at Pozzolo on the Mincio; served with distinction at Jena, 1806, and Friedland, 1807; was defeated at Baylen, Spain, June, 1808, by De Castaños, who took from him 18,000 prisoners. For this reverse he was disgraced and imprisoned, but his condemnation was annulled on the return of Louis XVIII, who appointed him Minister of War.

Dupont de l'Eure (dė lėr'), **Jacques Charles,** 1767–1855; French statesman; b. Neubourg; was a friend of the Revolution, and remarkable for his consistent advocacy of liberal principles throughout his political career; member of the Council of Five Hundred, 1798; of the Corps Législatif, 1813. As Vice President of the Chamber of Deputies during the Hundred Days, he showed admirable firmness in opposing the reactionary projects of the allies.

Dupont de Nemours (dė nė-mōr'), **Pierre Samuel,** 1739–1817; French economist; b. Paris; was of the school represented by Quesnay and Turgot, and associated in office with the latter, 1774, sharing in his schemes of reform; became a member of the National Assembly, 1790, where he sided with the constitutional monarchists. His steadfast opposition to the excesses of the mob marked him for vengeance after August 10, 1792, but he escaped the guillotine; was released from prison after the death of Robespierre, and elected to the Council of Five Hundred. He came to the U. S., 1799, returned to France, 1802, and was selected to arrange the Louisiana Purchase, 1803. He refused to take office under Napoleon, and settled in Wilmington, Del., 1815.

Dupré (dü-prā'), **Jules,** 1812–89; French painter; b. Nantes; eminent as a landscape painter of the Romantic school; also distinguished in marines; his "Morning" and "Evening" are in the Luxembourg Gallery, Paris.

Du'ra Ma'ter. See BRAIN.

Duran (dō-răn'), **Agustin,** 1789–1862; Spanish scholar; b. Madrid; chief librarian of the Royal Library, 1836, and director of it, 1854; chiefly known for his "Romancero General," or collection of all the Spanish ballads accessible in his time, which long remained the best work of the kind in Europe.

Duran'go, capital of the state of Durango, Mexico; 30 m. E. of the Sierra Madre; on the little Rio del Tunel, at an elevation, according to Humboldt, of 6,847 ft. The celebrated Cerro del Mercado, near the city, is a hill about a mile long and 600 ft. high, composed of iron ores (magnetic and hematite). Durango was founded by Alonso de Pacheco, 1563, and long marked the limits of civilization in N. Mexico. It is an episcopal seat; has a large cathedral, many churches, and a noted mint, established 1811. The city is furnished with warm water from a large spring at the upper end. Pop. (1900) 31,092.

Durban', chief commercial town and only port of the British colony of Natal, S. Africa; on the N. side of the bay of Port Natal; founded, 1834, by the British Capt. Gardner, who named it in honor of Sir Benjamin D'Urban, Governor of the Cape. Pop. (1904) 69,903.

Dür'er, Albrecht, 1471–1528; German painter and engraver; b. Nuremberg; son of a goldsmith; lived in Venice, 1505–7; in Nuremberg after 1521; produced paintings in oil, engravings on wood and copper, and etchings; paintings include "The Four Apostles," now in Munich; "Adoration of the Magi," portraits of himself, of Melanchthon, Erasmus, and other distinguished men of his time; engravings on copper include "Adam and Eve," "Melancholia," "Knight, Death, and the Devil," "Saint Jerome in his Study"; best woodcuts, the series "The Apocalypse," "The Great Passion," "The Little Passion," "Life of the Virgin"; author of "Instruction in the Art of Mensuration with the Rule and Compass," "Art of Fortification," "The Proportions of the Human Body," etc.

Du'ress, in law, restraint of the person or of goods. 1. *Of the Person.*—This is exercised in two modes, either by threats or by imprisonment. Duress by threats formerly occurred where a person entered into a contract or performed some other act through fear of loss of life or limbs, or grievous bodily harm. It was even an excuse for some crimes, but not for those of the graver class, such as the killing of an innocent person. Modern cases are not quite so technical, and the tendency is to make the presence of duress turn on positive inquiry whether the threat would overcome the will of a person of ordinary firmness and prudence. In equity the word is used in a broader sense than in the courts of common law, and includes cases where a party is in extreme necessity and distress. Thus a threat to prosecute criminally a son, whereby a father is induced to execute a deed in order to save him from arrest, is sufficient duress in equity to furnish a basis to set the conveyance aside. A contract executed under duress is not void, but only voidable at the election of the injured party.

2. *Duress of Goods* refers to a case where a person having goods illegally detained pays money to obtain their release. If such payment is made under protest, the money may be recovered as being paid under compulsion.

An instance is an exaction of unauthorized duties upon goods by the collector of a port.

The question has been raised whether the doctrine of duress can be applied in international law to relieve a nation from the obligations of a treaty of peace. The answer must in general be in the negative, as the terms of peace, however humiliating, are the chances of war to which the parties have appealed.

Dur'ham, episcopal city of England, capital of the shire of Durham; 14 m. S. of Newcastle; is built on seven small hills, and nearly encompassed by the Wear River; noted for its magnificent cathedral, a Norman structure founded 1093, 507 ft. long by 200 wide, with a central tower 214 ft. high. The church, built by Bishop Carileph, which is distinguished by strength, exquisite proportions, and elaborate execution, still forms the main part of the whole construction. Many additions, however, have been made; as the Galilee or W. chapel, from the Transition period, built by Bishop Pudsey between 1153 and 1195, the E. transept, or the so-called Nine Altars. The cathedral contains the tombs of Saints Cuthbert and Bede. Though there was a small Roman camp at Maiden Castle Hill, close by, Durham itself dates only from the end of the tenth century. Opposite the cathedral is the castle founded by William the Conqueror, now occupied by the university. Pop. abt. 15,000.

Dur'is of Sam'os, Greek historian of the fourth century; disciple of Theophrastus; uncritical collector of historical and annalistic material; one of the sources of Diodorus and Plutarch.

Dur'ra, Dhur'ra, or **Door'a,** called also INDIAN MILLET, a kind of grain cultivated in Asia, Africa, and S. Europe. The genus has hermaphrodite spikelets and outer husks, with three small teeth at the end. The species are mostly tall, broad-leaved annual grasses, with large panicles, and strong stalks containing a sweet, juicy pith. The durra (sometimes called jowaree in India) has grain larger than mustard seed. It yields abundant crops, and the stalks and leaves are food for cattle and horses. The sugar cane is a variety of the species. The Kaffir corn is chiefly valued as food for horses.

Duruy (dü-rü-ē'), **Jean Victor,** 1811–94; French historian; b. Paris; Minister of Public Instruction; made important changes in the educational system of France; besides works on historical geography, wrote "History of the Romans," "History of France," "History of Ancient Greece."

Duse (dō'sā), **Eleonora,** 1859– ; Italian actress; b. Vigevano; made her début abt. 1880, as leading lady in the plays of Dumas and Sardou; later appeared in Germany, England, and the U. S. in such rôles as *Adrienne Lecouvreur, Magda, Nora, Francillon, Gioconda,* and *Francesca da Rimini.*

Düs'seldorf, city of Rhenish Prussia, at the confluence of the Düssel and the Rhine, 20 m. NNW. of Cologne; divided into four sections, the Altstadt, Neustadt, Friedrichstadt, and Karlstadt; possesses many handsome streets and parks, the Hofgarten being one of the finest in Prussia. Art has flourished here more than in any other town in Germany, especially since 1882, when Frederick William III renovated the building of the academy, founded 1767, and when Cornelius, Schadow, and other artists founded the Düsseldorf School for painters. There is also a school for architects. A collection of 14,500 drawings of the old masters remain of the picture gallery, which was transferred to Munich, 1805. Düsseldorf was for some time the capital of the Duchy of Berg, with which it passed to Prussia, 1815. Pop. (1905) 253,274.

Dust, particles of matter so fine that they may be raised and wafted by the wind. Recent discoveries have shown that dust plays an important part in spreading infections, and experiments are being made to discover a practical method of combating the dust of public thoroughfares. In Massachusetts, the use of calcium chloride, tar, and oil, has been found beneficial on asphalt roads; in France, sea salt and sea water have been proposed as a cheap method, after tests at Bordeaux; in England, tar washing was first tried, but found to be only a temporary palliative, and later much hope was placed in hot slag taken direct from a furnace, which, with the mixture of a toughening adjunct, also created a waterproof road material; in Germany what is locally known as the *goudronnage* treatment has been pronounced a success as a dust preventive; and the same may be said of *goudronite,* which has been tried in Mentone, Nice, Beaulieu, Monaco, and other cities; while in Zurich, Switzerland, a macadam of fine gravel and tar has been found effective. The problem is a double one, to find a material that will prevent the creation of dust and at the same time possess the element of durability.

The absurd method of whipping the dirt off the floor with a broom, and then wiping back to the floor the dust that settles on the furniture, is giving way in the better class of hotels and residences to the vacuum-cleaning process. A motor fan or bellows is made to draw a strong current of air through a flexible tube. The end of the tube is placed against the article to be dusted, and the current of air carries into the apparatus all particles of dirt, so that they are permanently removed instead of being beaten or whisked up into the air only to be redeposited. In addition to being infinitely more effective, the vacuum-cleaning process requires less exertion on the part of the worker, who has only to move the nozzle of the tube along the surface to be cleaned.

Dus'tin, Hannah, b. abt. 1660; American heroine; wife of Thomas Dustin, of Haverhill, Mass.; taken prisoner by the Indians in the attack on Haverhill, March 15, 1698, her nurse and infant one week old being also taken; the child was soon after killed. She was placed in an Indian family on an island (now called Dustin's Island) in the Merrimac River, near the mouth of the Contoocook, in New Hampshire, but with the aid of the nurse and a white

captive boy she killed all the Indians in their sleep, except a squaw and a boy who escaped, and returned to Haverhill with their scalps.

Dutch East In'dia Com'pany. See EAST INDIA COMPANIES.

Dutch Gap Canal', cut through the narrow isthmus of a peninsula known as Farrar's Island, in the James River, 5 m. below Richmond, Va.; made during the Civil War to afford the national vessels a nearer approach to the Confederate works. It was of no service to either side during the war, but has since shortened the navigation of the river to Richmond 7 m.

Dutch Gold, alloy of copper and zinc, closely resembling common brass, but having rather less zinc in its composition than brass generally has; is beaten into thin plates, resembling gold leaf in appearance when new, and used for ornamentation instead of gold leaf.

Dutch Gui'ana. See GUIANA.

Dutch Reform'ed Church. See REFORMED CHURCH OF AMERICA.

Dutch West In'dia Com'pany, an association formed in the Netherlands in 1621 for the purpose of trading with America and Africa, establishing colonies, and fitting out privateers against the Spanish and Portuguese. The capital was eventually 18,000,000 fl. The company received from the state 200,000 fl. yearly for five years, a monopoly of trade with Africa and America, the right of constructing forts, raising fleets and armies, and making treaties; troops were to be furnished by the state, but paid by the company; and in case of war the state agreed to lend a fleet. New Amsterdam (New York), already founded, was strengthened; powerful colonies were established in the W. Indies and Guiana, and for half a century the fleets of the company ravaged the shores of Spanish and Portuguese America. The continual wars with Spain, Portugal, and England eventually proved the ruin of the company. In 1674 it was forced to dissolve. A new company was formed in 1675, and held together until 1791, but it was never very prosperous.

Du'ties. See TARIFF.

Duum'viri, title of various magistrates of ancient Rome and her colonies. Two men jointly held the office, whence the name. The duumviri, "*juri dicundo*" (for pronouncing judgment), were chief magistrates in municipal towns. Naval duumviri were occasionally appointed to equip fleets. Duumviri "*perduellionis*" were appointed to try cases of treason (*perduellio*) and parricide. Quinquennial duumviri were the censors of municipal towns, and were chosen every five years, but the duties of the office occupied only one year. The position was one of great dignity. Sacred duumviri were sometimes appointed to erect temples.

Duyckinck (dī'kĭnk), **Evert Augustus,** 1816–78; American author: b. New York; founder and editor of the *Literary World*; with his brother George published "Cyclopedia of American Literature," two volumes, 1856; also wrote "History of the War for the Union," three volumes, 1861–65.

Dvi'na. See DWINA.

Dvořák (dvōr'zhăk), **Antonin,** 1841–1904; Bohemian musician; b. Mühlhausen; became first a violinist, then an organist; began composing at an early age, making liberal use of Bohemian folk music; appointed musical director of the National Conservatory of Music, New York, 1892. His best-known works are: "Stabat Mater," which gave him wide fame; "The Specter's Bride," "The King and the Collier," "Requiem Mass," a "Te Deum," and the triple overture, "Nature, Life, Love."

Dwarf, any animal or plant greatly below the usual size of its kind, particularly a human being of small dimensions. In ancient times dwarfs were kept by persons of rank for their amusement, and Roman ladies employed them as domestics. In Europe the passion for dwarfs reached its height in the reigns of Francis I and Henry II of France. Among the most celebrated dwarfs were Philetus of Cos, a philosopher and poet, who lived abt. 330–285 B.C.; Geoffrey Hudson, b. 1619, who was 3 ft. 9 in. high; Joseph Borowlawski, b. 1739, who attained the height of 39 in., and was remarkable for acute intellect; and Nicolas Ferry, or Bébé (33 in. high), who was a favorite of Stanislaus, King of Poland. In the U. S. the best-known have been Charles S. Stratton ("Tom Thumb"), who married Lavinia Warren; "Commodore Nutt," who married Lavinia's sister, Minnie, and the little men and women who performed in "The Midget City."

Dwarf Tribes. See PYGMY TRIBES.

Dwarf'ing, stunting plants or trees in their growth. It may be produced in three ways—by grafting on dwarf slow-growing stocks, as, for example, the pear on the quince; by planting in small pots filled with poor soil, by which the plant is starved and stunted; and by causing a portion of the extremity of a branch to produce roots, and then cutting it off and planting it in a pot with poor soil. This last is the Chinese method, and is thus performed: The extremity of a branch 2 or 3 ft. long in a fruit- or flower-bearing state is selected, and a ring of bark is taken off at a point where it is desired that roots should be produced. The part thus denuded of bark is covered with a ball of clay, kept moist with the frequent application of water. After the roots have grown out the branch is cut off, planted in a pot of poor soil, and sparingly supplied with water. The dwarf will remain nearly the same size for years.

Dwight, Timothy, 1752–1817; American clergyman; b. Northampton, Mass.; a tutor in Yale College. 1771–77; ordained minister of a church at Fairfield, Conn., 1783, where also he was principal of a flourishing academy; President of Yale College and Prof. of Divinity from 1795 till his death; chief work "Theology Explained and Defended in a Series of 173 Sermons," five volumes, 1818.

Dwina (dwē'nä), or **North'ern Dwina,** large river of Russia; formed by the confluence of the Suchona and Jug, in the government of Vologda; flows nearly NW., and enters the Gulf of Archangel by three principal mouths; near Archangel its width exceeds 4 m.; length estimated at 450 m.; with the Suchona, 760 m.

Dwina, or **West'ern Dwina,** river of Russia; rises in the government of Tver near the source of the Volga; is the boundary between Livonia and Courland and enters the Gulf of Riga, 7 m. below the town of Riga, where it has an average depth of 26 ft.; length about 580 m. From Riga to Dünaburg the ship canal across Russia from the Baltic to the Black Sea follows the Dwina.

Dy'aks, aborigines of BORNEO (*q.v.*).

Dye'ing, art of coloring yarn or cloth; has been practiced from the most remote antiquity. The fibers and fabric usually dyed are either cotton, linen, silk, or wool. The coloring matters employed are either natural products of animals or plants, or are the results of chemical processes. Thorough cleansing of the fibers is a necessary preliminary to dyeing. Resinous and oily matters must be removed to give the dye liquors free access to the fibers, and natural coloring matters must be destroyed in order to secure the brightest and clearest tints of the dyes. The dyeing is effected upon loose or unspun fibers, yarn, and woven cloth, and the operations performed differ according to the nature of the fiber, its condition, and the dyestuff used. Loose materials are dyed in tubs or vats, yarn is hung over sticks which rest upon the top of the vat and is turned from time to time; or warp yarns are dyed in long chains, while pieces are dyed in a continuous dyeing machine, divided into a series of compartments which contain the necessary mordants and dyestuffs, or upon a jigger, a machine consisting of two rollers placed above a tank which contains the dyeing liquor; the pieces are wound back and forth through the dye bath upon the rollers. Some colors combine with the fibers as soon as they are immersed in their solutions and are called substantive. Silk and wool take colors much more readily than cotton and linen; many dyes are therefore substantive for these animal fibers, and certain aniline colors belong to this class. With such colors the operations of dyeing are simple. They consist in the mere immersion of the yarn or cloth in cold or hot solutions of the dye, with sufficient handling to secure the even distribution of the color. Agents (called resistants), as acids, alkalies, alum, etc., are often added to fix or set the color, or to obtain a more even shade. For adjective dyes, those which will not unite directly with the fibers, the aid of mordants is necessary. Mordants are bodies which possess an affinity for colors, and which can be fixed in an insoluble condition on or within fibers. Mordants often affect the natural tints of the dyes, thus enabling the dyer to produce a variety of shades with the same dye. This is very important in calico printing, as it enables the dyer to produce several colors on the same cloth by one operation of dyeing. Metallic pigments are often produced in the yarn or cloth by the successive application of the agents necessary for their production, or attached mechanically to the surface by albumen on other adhesive substances. Thus when cloth mordanted with oxide of iron is passed into an acidulated solution of potassium ferrocyanide, an insoluble Prussian blue is produced.

Dye'stuffs, bodies used to impart color to textile fibers and fabrics. Many colors exist already formed in plants; others are produced from colorless bodies by oxidation or other processes. Of the animal dyes *cochineal,* the female insect of the species *Coccus cacti* is the most important. It produces scarlets and crimsons of great brilliancy. Tyrian purple, formerly obtained from mollusks, is no longer used. Galls, which are excrescences produced on the leaves and leaf stalks of the oak by puncture of the gall wasp, have a characteristic constituent of tannic acid which, with iron salts, produces drabs and blacks. Sepia, the fluid of the cuttlefish, is not used as a dye, but as a water color by artists.

The most important vegetable dye derived from the roots of plants is *madder,* which produces on cotton the most permanent reds, purples, and chocolates. It contains two principles, alizarin and purpurin. Its use as a dyestuff has nearly ceased, owing to the manufacture of alizarin from coal tar. Of the wood dyes, logwood, which produces red, purple, violet, blue, and black; Brazil wood, which produces rich reds; and sandalwood, which produces reds, violets, and scarlets, are the most important. The only bark yielding important dyestuff is the *quercitron* from the *Quercus tinctoria,* from which a rich yellow is derived. The leaves of the sumac yield tannic acid, valuable as a mordant, and a yellow dye. Saffron, another yellow dye, consists of the stigmas of the *Crocus sations.* Indigo comes from the various species of the *Indigofera.*

Artificial or chemical colors are divided into pigments and coal-tar colors. Pigments are insoluble metallic compounds, the most important of which are *Prussian blue,* which is ferrocyanide of iron; *chrome yellow* and *orange,* which are chromates of lead; *Schweinfurt green,* the aceto-arsenite of copper; *Guignet's green,* a hydrated oxide of chromium and *ultramarine,* a compound of alumina, silica soda, and sulphur. Coal-tar colors, which are rapidly replacing natural colors, are derived from the refuse tar produced in gas works from bituminous coal. See DYEING.

Dy'er, Eliphalet, 1721–1807; American jurist; b. Windham, Conn.; during the French War, 1755, commanded a Connecticut regiment; 1762 was elected a member of council; 1763–65 went to England as agent for the Susquehanna Company; was a delegate to the Stamp Act Congress; was a member of Congress during the War of Independence.

Dyer, or **Dy'ar, Mary,** d. 1660; Quaker martyr; wife of William Dyer, who removed from Massachusetts Bay to Rhode Island with other adherents of Anne Hutchinson, 1638; defying the law banishing Quakers from the Massa-

chusetts colony on pain of death, she twice returned, and for the second offense was hanged on Boston Common.

Dyke. See DIKE.

Dynam'eter, instrument for determining the magnifying power of a telescope; is formed by dividing the eye lens of a positive eye piece into two equal parts and mounting them so that the divided edges are made to slide along each other by means of a fine screw apparatus. Each semilens gives a separate image; and the distance apart of the two centers, measured by the revolutions of the screw when the borders of the two images are brought into contact, gives the distance of the centers of the images or the diameter of one of them.

Dynam'ics, the science which deals with the laws of force in their relation to matter at rest or in motion. It is to Newton that we owe the clear statement of the three primary laws of force. These are: (1) That every body remains in a state of rest, or of uniform motion, along a straight line, unless it is compelled by force to change that state. (2) That change of motion is in proportion to the force employed, and occurs along the straight line in which the force acts. This change of motion includes both change of rate and of direction. (3) That, as the result of every action, there is also and always an equal reaction. These laws, which were formulated from experiment, involve the conception of force as a primary influence or action expressed in terms of space, time, and matter. Now, in dealing with the laws of force, a standard of measurement is required which shall be applicable to all forces at all times, and we therefore require to begin by establishing units of space, time, and mass. There are two systems of units in use, the one British, the other French. In the British system the foot is taken as the unit of length, and the second as the unit of time. In the French the centimeter is the unit of length, the second the unit of time; the unit velocity in the one case being that of 1 ft. per second, in the other 1 cm. per second. The British unit of mass is the pound (the mass of a certain lump of platinum deposited in the exchequer office, London); the French, the gram; and accordingly the French units of space, mass, and time are commonly known as the C. G. S. (centimeter, gram, second) units. As the weight of a pound (or a gram) is not the same at all parts of the earth's surface, it cannot give us of itself an absolute or dynamical unit of force, that is, an invariable unit; but taking it in conjunction with unit time and unit velocity, we do obtain such a unit. Two absolute units of force are in common use in dynamics, the poundal and the dyne; the latter being the absolute unit in the C. G. S. system. The former is that force which, acting on the mass of 1 lb. for one second, generates in that mass a velocity of 1 ft. per second. The latter is that force which, acting on the mass of 1 gm. for one second, generates in that mass a velocity of 1 cm. per second. It is important in dynamics to distinguish between mass and weight. The mass of 1 lb. is the quantity of matter equal to a certain standard quantity (a certain lump of metal), and is quite independent of force. The weight of 1 lb. is the force with which the mass of 1 lb. is attracted to the earth's surface by the force of gravity. Another important term is momentum: the momentum of a body in motion at any instant is the product of the mass of the body and the velocity at that instant. Dynamics is divided into two great branches; statics, which treats of solid bodies at rest under the action of force; and kinetics, which treats of the action of forces in producing motion in solid bodies. Formerly the latter alone was called dynamics, and to this, in conjunction with statics, the general name mechanics was given. In the wide sense dynamics includes also hydrostatics. See FORCE; MECHANICS; PHYSICS; STATICS.

Dynam'ic U'nits, units for measuring forces and their effects. A *unit of work* combines two elements—*viz.*, force acting, and space through which it acts; and is the product of a unit of force and a unit of distance. Such is the foot pound, which is the work done in raising 1 lb. 1 foot; or the kilogrammeter, the work done in raising 1 kilo. 1 meter. A *unit of power,* or of *rate of working,* involves the additional consideration of time. It is a definite amount of work conventionally fixed upon for purposes of comparison as the work of a unit of time. Thus the horse power, the unit of rate commonly used in the U. S. in estimating the performance of machines, is 550 foot pounds per second, or 33,000 per minute. The *cheval vapeur* (French horse power) is 75 kilogrammeters per second, or 4,500 per minute; equal to 542½ foot pounds per second, or 32,550 per minute, nearly—a little less than the former.

Dy'namite. See EXPLOSIVES.

Dy'namo, or Dynamo-elec'tric Machine', originally, the type of magneto-electric machine in which electro-magnets are used instead of permanent magnets; now, popularly, any machine for generating electric currents by relative motion of a conductor and a magnet. Its action depends on the principle, discovered by Faraday in 1831, that when part of an electric circuit is moved across a magnet's field of force a current flows through it, the energy of the current being the transformed energy of the motion of the coil. In the modern dynamo the magnet (whether permanent or an electro-magnet) that furnishes the field of force is called the *field magnet,* while the circuit, a coil of wire often containing a soft-iron core, is called the *armature.* These are combined and arranged in a multiplicity of ways. In Fig. 1 a single loop of wire is shown, revolving between the poles of a horseshoe magnet and cutting the imaginary force lines that run from pole to pole. As the direction of the current depends on the direction in which the lines of force are cut, the current will flow around the loop in the direction of the arrows during half the revolution, and in the other direction during the other half. Its intensity will also vary during the revolution. Thus the current produced will be variable and al-

ternating, but it may be changed to a continuous direct current by a device called a commutator. In practice, of course, not one loop of wire, but a coil of many turns, is used, and a number of pairs of small magnets is generally used to produce the "field." The armature may be stationary if desired, and the motion may be imparted to the field magnet, the result being the same.

Machines for producing a direct current without the use of a commutator are made by using a so-called "Pacinotti-ring" armature,

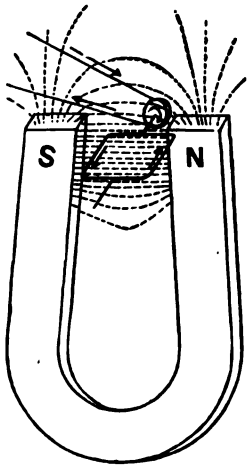


FIG. 1.—SIMPLE DYNAMO.

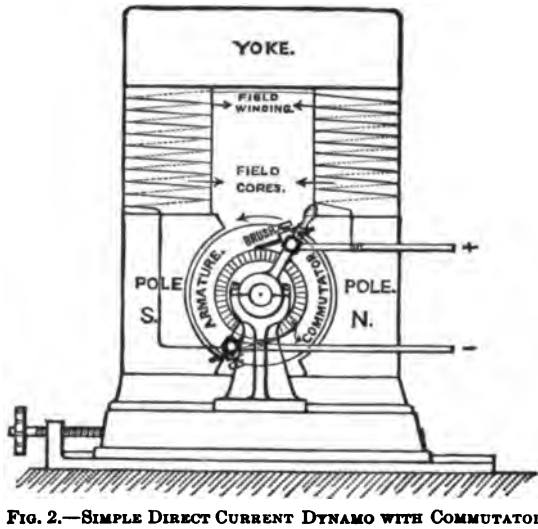


FIG. 2.—SIMPLE DIRECT CURRENT DYNAMO WITH COMMUTATOR.

in which the coil is wound on a ring of soft iron. When this is revolved in the field, the current, if taken off at two definite points, will flow continuously in the same direction. Conversely, if a continuous current from an outside source is passed through the armature, the latter will rotate continuously. This fact, called on its discovery the "reversibility" of this type of machine, is the basis of the modern motor, and has made possible the present long-distance transmission of electric energy, electric traction, etc. When the field magnet, as now in all large machines of whatever type, is an electro-magnet, the current that excites it is a portion of that generated by the machine itself. Enough residual magnetism remains in the core to start the action at a low intensity, which rapidly rises to the maximum as the electro-magnet gains its full power. Machines with permanent magnets ("magnetos") are now generally small, like those used to ring telephone bells and those used to generate currents for medical treatment.

Huge dynamos, with armatures rotating horizontally, set on the same shaft with a turbine water wheel, are used in great transmission plants, like those at Niagara. These transform energy to the electric form at the rate of many thousands of horse power each. See ELECTRICAL MACHINE.

Dynamom'eter, instrument or apparatus for measuring energy exerted or work performed. Any contrivance may be so called which indicates the intensity of a force used to produce motion. The work done is found by multiplying the mean effort thus indicated into the space passed over by the point where the force is applied. A dynamometer may record only the intensities of the force, space being ascertained independently, or it may record both force and distance traversed. The torsion dynamometer and the spring dynamometer are best suited to measure variable forces, but there are instruments of this class in which force is measured by the resistance of fluids driven through small apertures. For measuring the work of fluid pressure, a mechanism on the principle of the steam-engine indicator forms the dynamometer in common use. In this the pressure of the fluid upon a small piston is resisted by a spiral spring. A pencil which moves with the piston traces upon a moving slip of paper a curve, of which the ordinates (vertical straight lines) give the pressure, while a straight line perpendicular to these shows the distance passed by the surface pressed. The mean pressure multiplied by this distance gives the work done.

Dyne, absolute unit of force. Forces are measured by means of the motion which they are capable of imparting to matter. A dyne is the force which, applied to a gram (mass unit) for one second of time, will impart to it a velocity of 1 cm. per second. The poundal, a force unit used to some extent in the British Empire and in the U. S., is equal to 13,825 dynes.

Dys'entery, name applied to two diseases characterized by pain in the bowels, frequent and bloody stools, and ulceration of the intestines and general weakness and emaciation. An early saline purge, rest in bed, liquid diet, and warm application to the abdomen and injections under the direction of a physician are the main modes of treatment. *Amœbic dysen-*

tery, widely prevalent in the tropics of the U. S., is acquired through drinking contaminated water or eating green vegetables. In acute cases death may occur within a week. Abscess of the liver is a complication of amœbic dysentery. *Bacillary dysentery*, due to the action of the Shiga bacillus, is the great scourge of armies, and has a greater death roll than actual battle. It is also a cause of the dangerous summer diarrhea of infants. It may run its course in eight or nine days, but in severe cases the mortality is high. Ipecacuanha and opium are highly considered cures in the tropics.

Dyspep'sia, disordered state of the stomach, due either to inflammation and catarrh of its mucous membrane (acute or chronic gastritis) or to nervous derangement without organic change in the stomach itself (nervous dyspepsia).

Acute gastritis or catarrh of the stomach is usually due to errors of diet or abuse of alcohol. This form of indigestion gives an uneasy feeling about the stomach, with headache, coated tongue, and nausea, which is relieved by vomiting. "Fever blisters" may appear on the lips. The attacks usually pass away in twenty-four hours, and require no treatment beyond a dose of castor oil or calomel, and rest for the stomach by abstention from food.

Chronic dyspepsia is due to continued excessive eating or drinking, especially of improper foods and overmuch tea, coffee, or alcohol. Ice water with meals is a popular destroyer of digestion. There is heartburn, distress after eating, and nausea in the morning. An all-milk diet should be tried for a time, and then the patient should eat less, and take more time to masticate what is eaten. Washing out the stomach with warm water (lavage) will stimulate the glands to healthy secretion, and if the secretions are insufficient, dilute hydrochloric acid and pepsin, or bitter tonics like gentian or ipecac, may be taken.

Nervous dyspepsia, usually due to worry or overwork, assumes many forms. The patient may feel the motions of his stomach. In women vomiting may be a serious symptom. There may be over- or underacidity of the stomach and an inordinate craving for food. Gastralgia or severe pains in the stomach, without inflammation, may occur periodically. The rest cure or traveling with due exercise will greatly improve the condition. Bicarbonate of soda will overcome the burning sensation following a meal.

Dziggetai (dzĭg'gĕ-tā), or **Kou'lan**, a wild ass abounding in E. Turkey, Persia, Afghanistan, and the Punjab. It is one of the swiftest of quadrupeds. These animals live in troops under a leader, are extremely wild, and are much hunted for their flesh, and for the excitement of the chase. They are brown, with a black stripe along the back.

E

E, fifth letter and second vowel of the Latin alphabet, and of those derived from it. It is both short and long, and in the Greek alphabet has two corresponding forms, slender E, the fifth letter, and long E, the seventh. It is the basis of the vowel system, and the most diversified of the vowels in its shades of sound and uses. In English it has five sounds, called long, short, open, obtuse, and obscure, respectively, as in *mete, met, there, her*, and *brier*. See ABBREVIATIONS.

E, in music, the third note in the diatonic natural scale of C. The scale of E major has four sharps in the signature; that of E minor one sharp; and C sharp and G are their relatives, major and minor. E is the keynote of the "Phrygian" mode in the old Greek system of tonality.

Ead'mer, or **Ed'mer**, d. abt. 1124; English historian; became a Benedictine monk at Canterbury, and the friend and adviser of Archbishop Anselm; was nominated by the King of Scotland to be Bishop of St. Andrews, but the Archbishop of Canterbury asserted a claim to jurisdiction over the bishopric; this claim being denied by the Scotch and upheld by Eadmer, the latter was not inducted into the episcopate. He returned to the monastery, where he wrote "Historia Novorum," a valuable account of the principal events in England and in the English Church, 1066–1122. He also wrote lives of Anselm and several of his predecessors.

Eads (ĕdz), **James Buchanan**, 1820–87; American civil engineer; b. Lawrenceburg, Ind.; while a mere lad built and equipped a miniature steamboat, and a few years later invented a diving-bell boat for recovering wrecks, which brought him an ample fortune. He built the first ironclad steamer for the U. S. navy, and was instrumental in putting the first fleet of ironclads on the Mississippi, 1861–62; completed the construction of the St. Louis bridge, 1874; was long engaged in building the jetties at the mouths of the Mississippi; and in 1879 prepared plans for a ship railway across the Isthmus of Panama.

Ead'ward. See EDWARD.

Eager (ē'gĕr). See BORE.

Ea'gle, large rapacious bird of the order *Raptores* and family *Falconidæ*. Belongs to the genera *Aquila, Haliaëtus*, etc., and is characterized by a hooked beak and sharp, powerful claws. About seventy species are known. The eagle was regarded by the ancients as a symbol of royalty, and has the proverbial distinction of being the king of birds. Large specimens measure about 3½ ft. in length, and 9 ft.

from tip to tip of the expanded wings. They are all monogamous, and it is said that a pair will live together in perfect harmony until death separates them. They build their nests on a high tree, a ledge of rock, or an inaccessible cliff, and are supposed to live to a great age. The golden eagle (*A. chrysaëtos*) is a magnificent bird found in Europe, Asia, and N. America, deriving its name from the



BALD EAGLE.

golden-red color of the feathers which cover its head and neck. This species is the largest of the European eagles. The imperial eagle (*A. imperialis*), which inhabits Asia and S. Europe, is nearly as large as the golden eagle, and is similar in appearance. Much more common than the golden eagle is the sea eagle (*Haliaëtus albicilla*), also called the white-tailed and the cinereous eagle, because the adults have a grayish-brown color, with pale head, yellow beak, and white tail. The species is found all over the N. part of the Old World, and in Europe it breeds as far to the S. as the Albanian Mountains. The national bird of the U. S. is the bald eagle (*Haliaëtus leucocephalus*), which has a white head, neck, and tail. It is said to lay its eggs in the same nest year after year. It is fond of fish, which it generally steals from the osprey. The bald eagle is widely distributed in N. America, and frequents the seacoasts, lakes, and large rivers. It measures from 35 to 40 in. in length.

Eagle, a term applied to a military standard which first appeared among the Persians in the time of Cyrus the Younger, an eagle of gold being the royal emblem of ancient Persia. But it was also one of the most ancient Roman military standards, and in 104 B.C. it became the distinctive ensign of the Roman legions. It was of bronze or silver, and was carried upon a short staff. The Black Eagle is a decoration founded in Prussia in 1701, and now awarded only for the highest personal merit. It is an enameled maltese cross, with the motto, "Suum cuique" ("To each his own").

A gold coin of the U. S., equivalent to $10, is also termed an eagle. It bears the figure of an eagle, weighs 258 gr. troy, and, being nine tenths fine, contains $232\frac{8}{10}$ gr. pure gold. The only larger gold piece coined in the U. S. is the double, $20 value.

Eagle Hawk, name given to several species of birds of prey of the genus *Morphnus* and family *Falconidæ*, similar in form to the eagle, but inferior in size. They are natives of S. America, the E. Indies, and Africa.

Eagle Owl. See OWL.

Eagle Wood. See ALOES WOOD.

Ear, organ of hearing; divided into the external, the middle, and the internal ear. The first consists of the visible outer organ, a cartilaginous and fleshy structure, of the form best adapted to collect the vibrations of the air, and the meatus, or tubular opening, leading to the tympanum (the eardrum or middle ear). A firm fibrous membrane, the tympanic membrane, is stretched across this opening, and communicates vibrations, like the head of a drum. The middle ear is a cavity about the form and size of a kidney bean; from its lower point a tubular canal descends to the side of the pharynx (the tubular connection of the mouth and gullet), where it terminates in a trumpet-like expansion; this canal is called the Eustachian tube. Across the middle ear is stretched a chain of three small bones, connected with each other by cartilage and tendon. These are the malleus or mallet, the incus or anvil, and the stapes or stirrup, each named from some fancied resemblance. The office of this chain is to transmit the vibrations of the air; to aid in this, there are three minute muscles, which regulate the tension of the tym-



SECTION THROUGH THE EAR.

panic membrane, and the pressure of the stapes against the *fenestra ovalis*. This "oval window" is a membrane closing a hole of like shape (*foramen ovale*) between the middle and the internal ear. The internal ear, also called the labyrinth, consists of the vestibule, the three semicircular canals, and the cochlea. The

vestibule is an irregular cavity parted from the middle ear by the *fenestra ovalis*, and communicating with the semicircular canals by five openings, two of these canals being joined at one end. The cochlea is a bony structure resembling in form a snail shell; internally it is divided by a thin plate or lamina—bony, ligamentous, and muscular—into two cavities. One of these communicates with the vestibule, the other with the tympanum by the *fenestra rotunda* (round window), a piece like the *fenestra ovalis*, but of different shape. The whole internal ear is lined with a delicate membrane, secreting a fluid called perilymph. In the vestibule this fluid holds "ear sand"—crystalline grains of carbonate of lime called *otoliths*—the office of which is supposed to be to communicate the vibrations to the nerve surfaces. The filaments of the auditory nerve terminate, by loops or minute points, in the semicircular canals and the membranous lamina dividing the cochlea.

By the admittance of air to the tympanum through the Eustachian tube the pressure within the drum is kept equal to that on its outer surface. In the process of hearing, the vibrations of the atmosphere pass to the external ear, where they are concentrated; they then pass along the canal to the tympanum, which transmits them by the chain of bones to the *fenestra ovalis*; by this membrane the vibrations are passed to the fluid contents of the vestibule, from which they are taken by the nerve filaments. The *fenestra rotunda* serves to moderate or adjust the vibrations by giving a return vent: as the *fenestra ovalis* bulges in, the *fenestra rotunda* bulges out, and *vice versa*. See DEAFNESS; SENSATION; SENSES; SOUND.

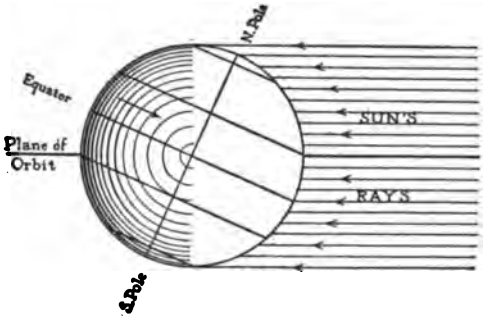
Earl'y, Jubal Anderson, 1816–94; American military officer; b. Franklin Co., Va.; graduated at West Point, 1837; afterwards studied law; served in the Mexican War as major; joined the Confederate army; major general at Gettysburg, 1863; commanded an army which invaded Maryland, July, 1864; defeated Gen. Lewis Wallace at Monocacy Junction; was defeated by Gen. Sheridan near Winchester, and at Fisher's Hill, 1864; attacked the Federal army at Cedar Creek, October, 1864, in the absence of Sheridan, who arrived in time to rally his forces and to gain a decisive victory; relieved from command in the Valley of the Shenandoah, 1865. After the war he practiced law in Richmond; wrote a pamphlet, entitled "Memoir of the Last Year of the War for Independence in the Confederate States."

Ear'nest, money, or a commodity, given "to bind a bargain," *i.e.*, to mark the conclusive assent of both parties thereto; originally a ceremonial pledge of good faith. It is valid evidence of a sale, forms a consideration sufficient to make valid a contract, and, in the case of the sale of a specific chattel, will vest the property in the buyer. It differs from part payment in that, on settlement, the value of an earnest token forms no part of the price; also the seller is not obliged to deliver the goods till the whole price is paid; and earnest is forfeited for breach of contract by the buyer, *i.e.*, if he fails to demand the goods and render full payment.

The giving of earnest is now in disuse, and though it is still recognized in the Statute of Frauds, the usual mode of binding a bargain, where that statute requires something more than oral agreement, is either by part payment or by drawing a written contract.

Ear'-shell, shell of various marine gasteropods of the *Haliotidæ*; found principally in warm regions; used by savage races for money and ornaments, by civilized man for ornamental work, and by the Japanese and Chinese for inlaying lacquer ware. On the Pacific coast of the U. S., the shells of the *Haliotis* are known as *abalones*, and there is an extensive fishery, chiefly carried on by Chinese, for the shells and the flesh, which is salted, dried, and exported.

Earth, globe on which we live, and the third planet in order of distance from the sun. The earth is a rotating globe, somewhat compressed or flattened at the poles. Its mean diameter is 7,917 m.; its polar diameter, 7,899 m.; its equatorial diameter, 7,926 m. Its surface area is 196,940,000 sq. m. The area of each polar zone is 8,204,000 sq. m.; of each temperate



INCLINATION OF THE EARTH.

zone, 51,215,000 sq. m.; and of the torrid zone, 78,102,000. It travels in a nearly circular orbit around the sun, at a mean distance of about 91,500,000 m. When nearest to the sun the earth is about 90,000,000 m. from it, and when at the greatest distance about 93,000,000 m. The earth completes its circuit about the sun in 365.2564 days, rotating on its axis in 23 hr. 56 min. 4 sec. of mean solar time.

It was supposed by the first astronomers and geographers that the earth was a vast fixed plane, probably circular, and that the heavenly bodies were carried around this fixed earth, passing alternately above and below its level. The discovery that the earth is not a plane has been ascribed to Thales of Miletus (b. abt. 640 B.C.), and it is said that he ascribed to it a spherical figure; but Anaximander judged it to be cylindrical. Newton held that the earth is an oblate spheroid, so that the polar diameter would be to the equatorial as 229 to 230. Hence a degree of latitude must increase in length from the equator to the pole; a conclusion confirmed by actual measurements. The length of a degree in Peru was found to be 362,790 ft., while the estimated length of a

degree in Sweden amounted to 365,744 ft. The difference was too great to be ascribed to errors of measurement, and it was justly regarded as demonstrating the general accuracy of Newton's reasoning. The equator itself is slightly elliptic, the longer and shorter diameters being respectively 41,852,864 and 41,843,096 ft., or differing by about 2 m.

There have been numerous experiments in regard to the density of the earth, from which a mean of 5.639 (water = 1) has been deduced. Most of the experiments were based on the difference of attraction at different heights, as indicated by the swing of a pendulum, or by the effect of a mountain on a plumb line, or on the method of Michell, applied by Cavendish, that of comparing the earth's attraction directly with the attraction of large spheres of heavy metal. Francis Baily made more than 2,000 experiments by this method, and deduced from them a density equal to 5.660; and from the close agreements of results it appears that this method is the most trustworthy. It is remarkable that Newton had said in his "Principia" that probably the mean density of the earth is five times that of water. Calculating on 5½ as a result sufficiently approximative and convenient for memory; taking the mean diameter of the earth considered as a sphere at 7,917.5 m., and the weight of a cubic foot of water at 62.3211 lbs., we find for its solid content in cubic miles 259,373 millions, and for its weight, in tons of 2,240 lbs. avoirdupois each, 5,842 trillions. The low specific gravity of the earth, compared with that which might be expected from the enormous pressure to which the interior parts are subjected and the compressible nature of their materials, has led to the conclusion that the temperature of the interior is sufficiently high to exert an important counteracting influence. See GEOGRAPHY; GEOLOGY; PHYSICAL GEOGRAPHY; PLANET; SOLAR SYSTEM.

Earth Cur'rents. See MAGNETISM, TERRESTRIAL.

Earth'enware. See POTTERY AND PORCELAIN.

Earth'quake, tremor or shaking of the ground, naturally produced. It may be so gentle as to be imperceptible, and discovered only by the aid of delicate apparatus, or it may be of destructive violence. In either case the motions are of small amplitude, but are so rapid and brief that they are called shocks. Usually the ground moves upward and downward, or in a horizontal or an oblique direction through the space of a fraction of an inch, or at most of a small number of inches, and the oscillations are repeated several times. Vibratory motions are communicated to buildings, and in tall buildings the effects are apt to be cumulative, so that shocks imperceptible on the lower floors may be detected on upper floors. When shocks are severe they are usually accompanied by sounds comparable to the detonations from explosions near or distant. Other associated phenomena are fissures, faults, extravasations of water and mud, elevation, subsidence, the drying of springs, the opening of new springs, landslides, sea waves, and alluvial waves.

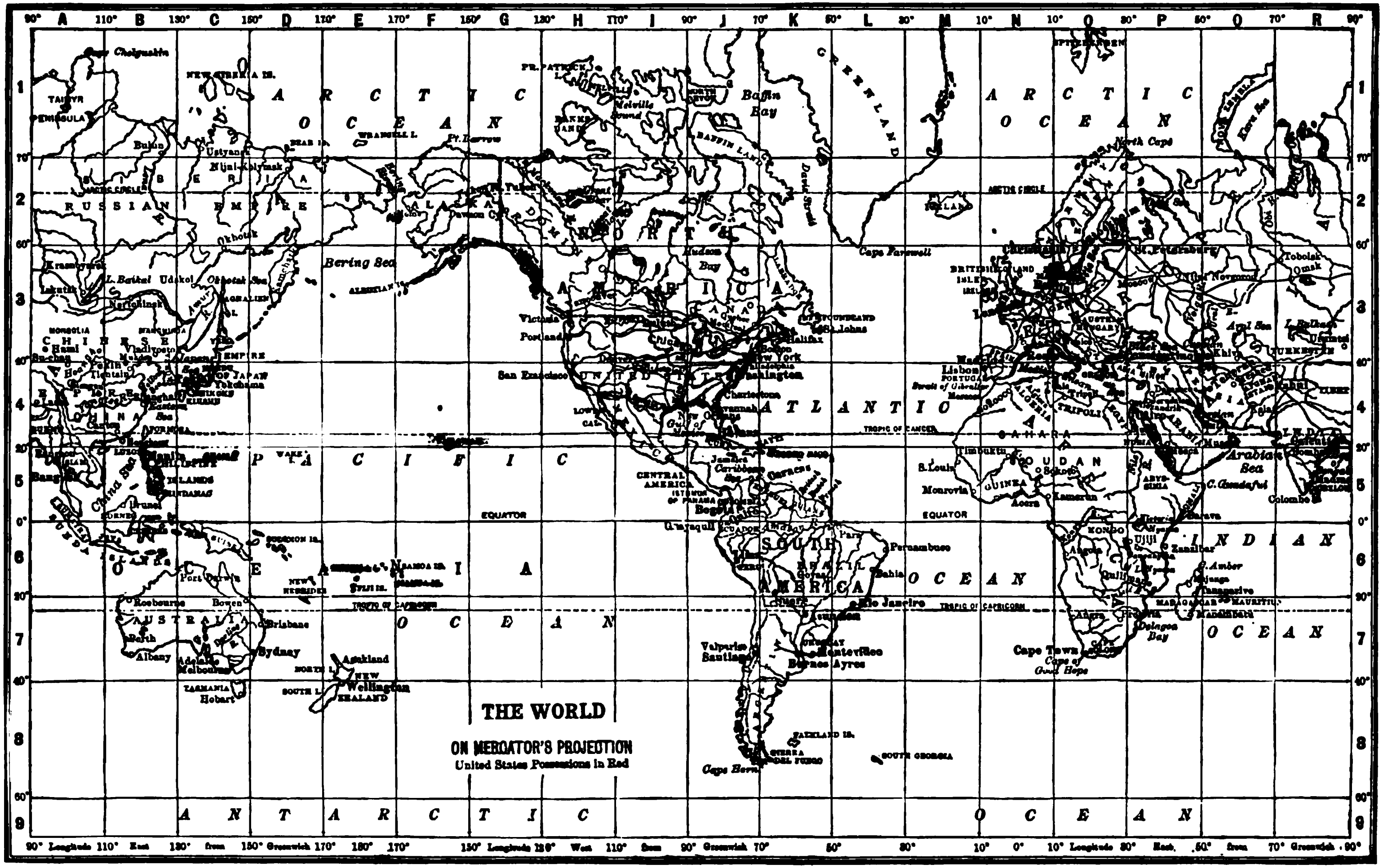


LAND HEMISPHERE.



WATER HEMISPHERE.

Scientists do not know the causes of all earthquakes, but important progress has been made in this direction. Many earthquakes are associated with volcanic phenomena in such way that their origin cannot be questioned. These are of two classes, due severally to explosion and to the formation of fissures. When the lava of a volcano in eruption contains a large amount of water, the conversion of portions of this water into steam produces explosions, throwing masses of lava into the air, and jarring of the ground, frequently to a distance of several miles. It sometimes happens that the force contained in the heated and imprisoned water, instead of being spent in a series of minor explosions, is stored for a long period, and then causes a great explosion whereby the top of the volcano is blown off. A number of catastrophes of this character have occurred in historic times. Other earthquakes connected with volcanoes do not accompany explo-


THE WORLD
ON MERCATOR'S PROJECTION
United States Possessions in Red
ARCTIC OCEAN
PACIFIC OCEAN
ATLANTIC OCEAN
INDIAN OCEAN
ANTARCTIC OCEAN
GREENLAND
Baffin Bay
Davis Strait
Hudson Bay
Bering Sea
Cape Farewell
NORTH AMERICA
SOUTH AMERICA
AUSTRALIA
RUSSIAN EMPIRE
SIBERIA
CHINESE EMPIRE
Arabian Sea
EQUATOR
TROPIC OF CANCER
TROPIC OF CAPRICORN
ARCTIC CIRCLE
Cape Horn
Cape Town
Cape of Good Hope
San Francisco
Victoria
Portland
New York
Washington
Charleston
Halifax
Lisbon
St. Petersburg
Tobolsk
Omsk
Valparaiso
Santiago
Buenos Ayres
Montevideo
Rio Janeiro
Pernambuco
Bahia
Sydney
Brisbane
Melbourne
Adelaide
Perth
Albany
Hobart
Auckland
Wellington
NEW ZEALAND
Colombo
Zanzibar
Delagoa Bay
C. Guardafui
Monrovia
St. Louis
Timbuktu
SAHARA
SOUDAN
GUINEA
Kamerun
FALKLAND IS.
SOUTH GEORGIA
Bangkok
Manila
Yokohama
Okhotsk
L. Baikal
Irkutsk
North Cape
SPITZBERGEN

sions, but are the preludes of eruption. After a long prelude of inactivity the rock of a volcano must be fissured in order that the lava may escape, and these earthquakes are referred to the fissuring of the rock under strains whose culminating effect is the opening of a vent for the lava.

Earthquakes of a third class are associated with the development of mountain structure of a certain type. In an extensive district in W. N. America the prevalent structure of mountain ranges involves extensive faulting. Each range consists of one or more huge blocks of rock, bounded by faults, *i.e.*, breaks through the thickness of the rock layers, accompanied with dropping away on one side of the break. In modern times there have been two instances in which renewed movement has occurred on old fault lines of this region, and each of these movements has been accompanied by a great earthquake.

In the study of earthquakes three classes of instruments have been employed. Seismoscopes are devices for determining automatically the time at which the vibration occurs. Seismometers are devices for determining the comparative violence or energy of earthquake shocks. Seismographs accomplish both these purposes, and also indicate the forms of the earthquake waves as they arrive at the surface of the ground. Such refinement has been attained in the construction of these instruments that it is possible to record tremors which escape the senses, and their employment has led to the discovery that earthquakes are far more numerous than had been realized. The most notable earthquakes of the U. S. occurred near the head of the Mississippi delta, 1811–12; in Inyo valley, California, 1872; at Charleston, S. C., 1886; and at San Francisco, 1906, the latter being by far the most destructive to life and property. Disastrous earthquakes in other countries occurred at Lisbon, 1755; Japan, 1703; Peking, 1731; and Messina, 1908.

The following table shows the approximate loss of life in the great earthquakes of the past two hundred years:

Year.	*Place.*	*Lives Lost.*
1693	Sicily	60,000
1703	Yeddo, Japan	200,000
1731	Peking	100,000
1755	Lisbon	50,000
1783	Calabria	60,000
1797	Quito	40,000
1861	Peru and Ecuador	25,000
1883	Krakatoa	35,000
1896	Japan	26,000
1902	Martinique	25,000
1905	India	15,000
1906	San Francisco	500
1906	Valparaiso	1,000
1907	Kingston, Jamaica	1,500
1907	Turkestan	14,000
1908	Messina	50,000–75,000

Earths, in chemistry, compounds consisting each of a metal combined with oxygen. The earths proper are alumina, zirconia, ceria, glucina, thoria, didymia, lanthana, yttria, and erbia. Magnesia, baryta, lime, and strontia are called alkaline earths, because they are less soluble in water than true alkalies, though they exhibit alkaline reactions. Their carbonates are insoluble in water, and are not alkaline.

Earth'shine, or (more properly) **Earth'light,** reflection of the sun's light from the earth to the moon, and back to the earth again. This phenomenon is often seen when the moon is very old or very new, the outlines of the full moon being rendered visible by the reflection.

Earth'worms, the popular name of a large number of species of worms belonging to many genera of *Oligochætæ* in the great class of *Annelida.* Formerly they were all regarded as forming the family *Lumbricidæ,* so called from its principal genus, *Lumbricus,* but now they are much divided. In all the body is cylindrical, and is made up of many essentially similar rings placed one after another, all without external organs, except small bristles used in locomotion. The mouth is provided with upper and under lips, and lacks teeth. The earthworms live on decaying vegetable matter, which they obtain by swallowing either leaves or earth which contains vegetable humus. The indigestible portions are voided on the surface as worm casts. Earthworms are of value to agricultural interests, for they occur in the earth where there is moisture enough to sustain life, and they are continually working over the soil. The earth eaten comes from below, while the worm casts are deposited on the surface. This action adds about a fifth of an inch annually to the soil, and serves to reduce inequalities and to bury beneath the surface stones and other objects. The earthworms are hermaphroditic, but incapable of self fertilization. Their eggs are laid in cocoons, and in some species one egg produces two worms. Earthworms when cut in two are capable to some extent of reproducing the lost portions. In the temperate zone they rarely exceed 8 or 10 in. in length, but in the tropics they are much larger—in Africa species being 1 in. in diameter, and nearly 6 ft. in length.

Ear Trum'pet, instrument for the relief of defective hearing. Ear trumpets are of a great variety of forms, but all depend upon the same principle—that of collecting and condensing the sound waves, and thereby intensifying the impression made upon the ear; sound readily reflected along conical tubes, either straight or coiled. Cases of slight deafness are aided by the wearing of "cornets," or small ear trumpets attached by a spring to the ear and concealed by the hair of the wearer.



EARWIG.

Ear'wigs, insects of the family *Forficulidæ*; so named from the popular delusion that they have a propensity to creep into the ear. They have a narrow body, strong and horny mandibles, long antennæ, and a pair of forceps at the end of

the abdomen. In the U. S. the name is applied to various small centipedes found about houses and beneath boards.

Ease'ment, privilege which the owner of one tenement, called the dominant tenement, has in respect to another, called the servient tenement, by which he may require the owner of the latter to permit something to be done thereon, or to refrain from doing something, which otherwise, as owner, he would be entitled to do. Among the principal easements are rights of way, the right to carry water or to obtain light or air over the adjoining lands, the right to support of land or buildings by adjacent land or buildings.

East Af'rica, Brit'ish. See IBEA.

East Africa, Ger'man. See GERMAN EAST AFRICA.

East An'glia. See ANGLIA, EAST.

East'bourne, watering place of Sussex, England; 3 m. NNE. of Beachy Head; has a martello tower, a fort, and a chalybeate spring. Pop. (1901) 43,344.

East Cape, on the coast of Siberia, latitude 66° 6′ N., longitude 169° 40′ W., projecting into Bering Strait, and the E. extremity of Asia, and almost facing Cape Prince of Wales in Alaska.

East'er, Christian passover and festival of the resurrection of Christ. The English name is probably derived from that of the Teutonic goddess of spring, Ostera or Eostre, whose festival occurred in early spring. Those of the early Christians who believed the Christian passover to be a commemoration of Christ's death adhered to the custom of holding the Easter festivity on the day prescribed for the Jewish pasch, the fourteenth day of the first month; that is, the lunar month of which the fourteenth day either falls on or next follows the day of the vernal equinox; but most of the Christian churches, attaching greatest importance to the day of Christ's resurrection, held to Easter's being celebrated on the Sunday after the fourteenth day of the moon of March, the day on which Christ suffered. This question was the cause of a serious difference in the Church as early as the second century, and was not finally settled till the Council of Nice (325). The rule was then adopted which makes Easter day to be always the first Sunday after the full moon which happens on or next after March 21st; and if the full moon happen on a Sunday, Easter day is the next Sunday. By this arrangement Easter may come as early as March 22d, or as late as April 25th. This sacred festival is celebrated in every part of the Christian world with great solemnity and devotion, and generally also with popular sports and observances. Among the best known of the latter is the custom of making presents of colored eggs, called pasch (paschal) or Easter eggs.

Easter, or **Waihu** (wī-hō′) **Is'land,** small island of volcanic origin in the Pacific Ocean; latitude 27° 6′ S., longitude 109° 30′ W.; area, 47 sq. m.; is 11 m. long and 4 m. wide; rises 1,200 ft. above the sea, and is scantily supplied with water. The inhabitants have traditions of their ancestors having come from the island of Oparo, 1,900 m. distant. The island has wonderful colossal statues in stone. It has belonged to Chile since 1888.

East'ern Archipel'ago. See MALAY ARCHIPELAGO.

Eastern Church'es, several bodies of Christians in W. Asia, E. Europe, and Africa. They are in three divisions: 1. The Orthodox Greek Church, composed of ten independent bodies, substantially one in discipline and doctrine, in mutual sympathy, and in deference to Constantinople. 2. The National churches, consisting of the Nestorian, Armenian, Syrian, Coptic, and Abyssinian. 3. The United churches, which have submitted to the pope, each consisting of branches of the Greek and one of the National churches.

Eastern Em'pire. See BYZANTINE EMPIRE.

Eastern Ques'tion, problem that confronts nations whose territories border upon or extend into the Balkan Peninsula, or whose interests would be affected by changes in the governmental systems of that region. It involves the future of the countries in E. Europe that have separated from Turkey, as well as the fate of the European possessions of that state. In recent years the tendency has been toward the disintegration of Turkey in Europe, with the result of erecting on the Balkan peninsula a number of independent or semi-dependent states, the fear of whose annexation by one or another of the great powers gives to the E. question its formidable character. The term sometimes refers to the conflicting interests of Great Britain and Russia on the frontiers of their E. territories, and in this aspect of the question Persia, Turkestan, Afghanistan, and India all fall within its scope.

Eastern Rite, or **Orien'tal Rite,** ritual of those branches of the Roman Catholic Church which acknowledge the supremacy of the pope, but which do not employ the Latin ritual. The E. rite differs from the Latin, not only in the languages employed in the service (Greek, Slavic, Armenian, Syriac, Ethiopic, Coptic), but generally also in the use of both elements (bread and wine) for the laity in the Eucharist, and in the permission of marriage to the lower clergy.

Eastern Rume'lia. See BULGARIA.

Eastern Shore, name given to those parts of Maryland and Virginia which are E. of Chesapeake Bay, and sometimes applied to the whole peninsula, including, in addition, the entire State of Delaware.

East Hum'boldt Moun'tains, lofty range in Elko Co., Nev., some of whose peaks exceed 12,000 ft. in height. Secret Valley and Fremont Pass cut the range, which is in parts well timbered with pines and firs, affording lumber. Its snows feed the springs by which lakes Franklin and Ruby are supplied.

East In'dia Com'panies, famous joint-stock trading companies, principally the ones in England, Holland, and France, formed to carry on commerce with the E. Indies. In 1600 a royal charter was granted to a number of London merchants under the title of "The Governor and Company of Merchants of London trading to the East Indies." This charter gave them an exclusive limited right to trade for fifteen years. They established factories at Surat, Cambay, and other places in India, abt. 1612. The charter was renewed from time to time. Madras was founded in 1639, and Calcutta in 1645. In 1698 the king granted a charter to a rival company, but the two companies were united in 1702 under a new charter, with the title of "The United Company of Merchants trading to the East Indies." In 1708 Parliament granted the company the exclusive privilege of trading to all places E. of the Cape of Good Hope to the Strait of Magellan. The monopoly of the China trade was abolished in 1833, and the company was then deprived of its original character as a commercial association, and became merely political. It was to govern India, with the concurrence and under the supervision of the board of control. All the real and personal property belonging to the company on April 22, 1834, was vested in the crown, and to be held or managed by the company in trust for the same; and the stockholders were to receive an annual dividend of 10½ per cent on a capital of £6,000,000 out of the revenues of India. The Sepoy mutiny of 1857, which was repressed with a great expenditure of life and treasure, combined with other causes, induced Parliament to transfer the dominion of India to the crown. This change was effected, after strenuous opposition from the company, in 1858.

The Dutch East India Company was formed in 1595–1602. After more than a century of active rivalry with the English company, the two were forced to make common cause against outside adventurers in 1722. Soon after this a more formidable rival appeared. The French company, established in 1664, had under the able management of La Bourdonnais and Dupleix become more than a match for the English company, and it was only by the genius of Clive that the French were overthrown and English supremacy was established. Other E. India companies (Danish, Swedish, Scottish) were of relatively slight importance.

East In'dies, popular but vague term applied to that part of SE. Asia occupied by Farther India, or Indo China, and the Malay Archipelago, the principal subdivisions being Lower Burma, Siam, Laos, Annam; Sumatra, Java, and the other Sunda Islands; Borneo, Celebes, the Banda Islands, the Molucca Islands, and the Philippines. The area of these, approximately given, is 1,157,200 sq. m., and the estimated population abt. 50,383,700. As used by some writers, the term includes Hindustan, and even China and Japan.

East'lake, Sir Charles Lock, 1793–1865; English historical painter; b. Plymouth; Royal Academician, 1830; president R. A., 1850; knighted 1850; keeper of the National Gallery, 1843; published "Materials for a History of Painting," 1847; his "Lord Byron's Dream" is in the National Gallery, London.

East Liv'erpool, city in Columbiana Co., Ohio; on the Ohio, 44 m. WNW. of Pittsburg; has excellent educational advantages; is one of the most important pottery centers in the U. S., having thirty potteries. Pop. (1906) 20,078.

East'on, capital of Northampton Co., Pa.; at the confluence of the Delaware and Lehigh rivers; 60 m. from Philadelphia; was settled, 1790; is the seat of Lafayette College, and has a silk mill, shoe factory, felt works, several organ factories, etc. The treaty with the Five Nations is recorded as having been made here, at the forks of the Delaware. Pop. (1908) 28,317.

East Or'ange, city in Essex Co., N. J.; 12 m. W. of New York, and adjoins Newark on the W.; is a place of suburban residence for many New York business men, and has manufactures of electrical dynamos, etc. Pop. (1906) 25,909.

East Riv'er, strait connecting Long Island Sound with New York harbor, and separating Manhattan and The Bronx boroughs on the W. from Brooklyn and Queens on the E.; about 10 m. long, and navigable by the largest vessels; contains Blackwell, Ward, and Randall islands, occupied by charitable and reformatory institutions of New York; is spanned by the Brooklyn, Williamsburg, and Queensboro bridges, with the Manhattan bridge under construction. There is a tunnel connecting Manhattan with Long Island (at Brooklyn), and three more are under construction (1909).

East St. Louis, city in St. Clair Co., Ill.; on the Mississippi, opposite St. Louis, Mo., with which it is connected by the Eads steel bridge; contains large stockyards and packing houses, breweries, rolling mills, steel works, locomotive shops, glass factories, and coal and coking plants; said to be the largest horse and mule market in the world; and has several national and private banks, a public library, and separate high schools for white and colored youth. Pop. (1907) 40,958.

Eat'on, Dorman Bridgman, 1823–99; American lawyer and publicist; b. Hardwick, Vt.; admitted to the bar and began practice in New York, 1850; chairman U. S. Civil Service Commission, 1873–75; drafted the law under which it was reorganized, 1883, and was at its head till 1886; drafted the law creating the Metropolitan Board of Health of New York City, 1886, and later that on which the police courts were organized; edited the seventh edition of Kent's "Commentaries"; author of "The Independent Movement in New York" and "Civil Service in Great Britain."

Eau Claire (ō klār'), capital of Eau Claire Co., Wis.; at the confluence of Eau Claire and Chippewa rivers; has a flour mill, grain elevators, foundries, paper mill; manufactures of boots and shoes, pearl buttons, electric dynamos and machinery, and a large lumber trade and wood-working industries. Pop. (1906) 18,981.

Eau de Cologne (ō dė kō-lōn'), or **Cologne Wa'ter**, celebrated liquid perfume invented by Farina of Cologne, where large quantities of it are prepared. It is also made in France and most other countries. The secret of the composition of true cologne has been carefully preserved by the Farina family, and the different business houses of Cologne bearing the name of Farina prepare perfumes which are by no means identical in odor.

Eau de Vie (ō dė vē'), French for BRANDY (*q.v.*).

Eaves (ēvz), in architecture, the lowest edges of the inclined sides of a roof, which project beyond the face of the wall, so as to throw off the water from the roof. The eaves are sometimes provided with a gutter and a downpipe or "leader" to carry off the water, which otherwise would be driven against the walls by the wind.

Ebal (ē'băl) **and Gerizim** (gĕr'ē-zĭm), two mountains in Palestine, within 200 paces of each other, and separated by a deep valley, in which stood the old city of Shechem, now Nablus. They were made memorable by the solemn ratification of God's covenant with the Jews after they had passed over Jordan, when six tribes were placed on Gerizim and six on Ebal, the former to pronounce blessings on those who should faithfully keep the divine law, and the latter to pronounce curses on those who should violate it. The Samaritans contended that this should have been done on Gerizim, and they built a temple on the latter, the ruins of which are still visible, and regarded it as the Jews regarded their temple at Jerusalem. The Samaritans still have an annual sacrifice on Mount Gerizim.

Ebeling (ā'bė-lĭng), **Christoph Daniel**, 1741–1817; German scholar; b. Hildesheim; devoted himself chiefly to geographical studies; for his great work, "Geography and History of N. America," was thanked by the U. S. Congress.

Ebenaceæ (ĕb-ē-nā'sē-ē). See EBONY.

Ebene'zer ("stone of help"), place where the Israelites were defeated (I Sam. iv, 1); also a memorial stone set up by Samuel to commemorate the victory at Mizpeh (1 Sam. vii, 5–12).

Eberhard (ā'bėr-härt), **Johann August**, 1739–1809; German philosopher; b. Halberstadt, Prussia; Prof. of Philosophy at Halle, 1778; a rationalist in theology, and an adversary of Kant in philosophy; his works include a "New Apology for Socrates"; a theory of the fine arts and sciences, a general history of philosophy, and an excellent dictionary of German synonyms.

Eberhard im Bart ("Eberhard with the Beard"), 1445–96; first Duke of Württemberg; became count of a part of Württemberg; consolidated it with that of his cousin, for which he was created duke in 1495; founded the Univ. of Tübingen, 1477; was a wise and liberal ruler.

Ebers (ā'bĕrs), **Georg Moritz**, 1837–98; German Orientalist and novelist; b. Berlin; lectured after 1865 in Jena on Egyptology, and became in 1870 Prof. of Egyptian Archæology in Leipzig. His works include a "Commentary on the Books of Moses," and the novels, "The Daughter of an Egyptian King," "Uarda," "The Sisters," "Serapis."

Ebionites (ē'bĭ-ō-nīts), term derived from the Hebrew *ebion*, "poor," name given at first to all Christians on account of their poverty; then given by Gentile Christians to Jewish Christians; and finally restricted to heretical Jewish Christians. Irenæus (between 182–188 A.D.) is the first to mention the Ebionites by name. The Pharisaic, or the older Ebionites, rejected the writings of Paul, insisted on the observance of the Mosaic ritual, and were humanitarians and millenarians. To them Christ was a mere man. The Essenic Ebionites, who arose later under Gnostic influences, were more speculative and ascetic, although they practiced marriage. They identified Christianity with primitive Mosaism, and made out of Christ a prophet. Ebionism never had any considerable influence, yet lingered till about the middle of the fifth century.

Eb'lis, or Ib'lis, in Arabian mythology, an angel, called, in his original character, Azazel or Hharis; when God created Adam and bade the angels worship him, Azazel refused, was transformed into a devil, and became the father of devils.

Eb'onite, hard black compound obtained by blending caoutchouc with variable proportions of sulphur, generally about half its weight; is called vulcanite in the U. S.

Eb'ony, name given to a number of tropical or warm-temperate woods. The large part of the ebonies are from the Old World tropics, and they are mostly members of the *Ebenaceæ*, or Ebony family. The true ebony belongs to two species of *Diospyros*, *D. embryopteris*, and *D. ebenum*. The former grows in India and the latter in Ceylon. Ebony is a hard and very dense wood, aromatic—particularly when burned—and capable of a high polish. It is ordinarily heavier than water, and of a deep black color. Two species are native in the U. S.

Ebro (ā'brō), river of Spain; rises in the Cantabrian Mountains near the N. boundary of Burgos; flows nearly SE., and enters the Mediterranean 22 m. E. of Tortosa; chief towns on its banks, Logroño, Tudela, Saragossa, and Tortosa; length, 440 m.

Ecarté (ā-kär-tā'), game at cards played by two persons with thirty-two cards, those of from two to six spots being excluded. The players cut for the deal, decided by the lowest card. The dealer gives five cards to each player, three and two at a time, and turns up the eleventh card for trump. If he turns up a king, he scores one, and if a king occurs in the hand of either player he may score one by announcing it before the first trick. The cards rank as follows: king (highest), queen, knave, ace, ten, etc. The nondealer leads; trumps take all other suits, but the players must follow suit if they can. Three tricks count one

point, five tricks two points; five points make game. Before play begins the nondealer may claim to discard any of the cards in his hand, and have them replaced with fresh ones from the pack. This claim the dealer may or may not allow; if it be allowed, the player can discard as many as he pleases. Sometimes only one discard is allowed, sometimes more.

Ecbat'ana, an ancient capital of Media; near the base of Mount Orontes, 165 m. SW. of Teheran; founded, according to tradition, by Semiramis, but, according to Herodotus, by Deïoces, 708 B.C. It was the favorite summer residence of the kings of Media and Persia, who had here a magnificent palace and a citadel of immense strength. Nothing is heard of it in history after its conquest by the Sassanidæ.

Ecce Homo (ĕk'sē hō'mō), "Behold the man," words uttered by Pilate (John xix, 5) when he brought Jesus forth to the people. Monkish tradition points out the spot, now marked by an arch called *Ecce Homo.* The phrase is also applied to pictures of Christ crowned with thorns.

Eccen'tric in machinery, a device by which circular motion gives rise to reciprocating or "to-and-fro" motion. In one form of eccentric a disk is made to revolve around a point not in its center. The disk turns in a metallic collar, which is thrown back and forth by the revolutions, and to the collar a rod is attached which receives the required to-and-fro motion. This arrangement is often used to give motion to sliding valves in steam engines.

Eccle'sia, great assembly of the Athenians, in which every free citizen might vote. After a time the management of the state fell into the hands of the archons, who were elected from the nobles. Solon afterwards appointed it to meet four times every thirty-five days. This was the ordinary ecclesia. The extraordinary assembly, called the cataclesia, was convened on occasions of unusual importance, and the citizens were summoned to it by special messengers. The magistrates who managed these assemblies were the prytanes, proedri, and epistates; the first convened the people, the second proposed the subjects on which they were to decide, the third presided over the proceedings.

Ecclesiastes (ĕk-klē-zĭ-ăs'tēz), a canonical book of the Old Testament. Its author writes in the person of "Quoheleth" (translated as "preacher" in English versions), who is described as king in Jerusalem and son of David —*i.e.,* Solomon. Since the time of Grotius (1644) the Solomonic origin of the book has been denied by Continental critics generally, even by some orthodox writers, the dates assigned ranging from 536 to 150 B.C. Its post-Solomonic origin has been argued (1) from its distinctly neo-Hebraic linguistic character; (2) from the sentiments expressed. On the other hand, the ascription of the book to Solomon has been defended by many scholars. The old Jewish tradition ascribes it to the men of Hezekiah. The two leading ideas of the Preacher are the vanity of earthly good and the certainty of judgment.

Ecclesias'ticus, or **The Wis'dom of Je'sus the Son of Si'rach,** book considered apocryphal by Jews and Protestants, but received as canonical by the Roman Catholic and Greek churches. By the Anglican Articles it is recommended to be read for edification. It appears to have been written in Hebrew at Jerusalem, either abt. 200 or abt. 300 B.C.

Echelon (ĕsh'ē-lŏn), in military tactics, an arrangement of troops when several divisions are drawn up in parallel lines, each to the right or the left of the one preceding it, like "steps," so that no two are on the same alignment. Each division by marching directly forward can form a line with that which is in advance of it.

Echidna (ē-kĭd'nă), in Greek mythology, a monster, half serpent and half woman; according to Apollodorus, the daughter of Tartarus and the mother of Cerberus, the Chimera, and other monsters.

Echidna, the name of a genus of quadrupeds belonging to the order *Monotremata,* having a long, slender muzzle, toothless jaws, powerful long-clawed feet, and strong, sharp spines thickly set in long, thick fur. The animals of this genus are related to the duckbill, and, like it, lay eggs. They burrow in the earth, and feed on ants and other insects, whence they are sometimes called spiny ant-eaters. They are from a foot to a foot and a half long.

Echinades (ē-kĭn'ă-dēz), in ancient geography, group of small islands in the Ionian Sea, off the coast of Acarnania, near the entrance of the Gulf of Corinth; are now the Curzolari Islands, and have five small villages. The battle of Lepanto (October 7, 1571) was fought here, and not where its name implies.

Echinoderms (ē-kī'nō-dĕrms), or **Echinodermata,** highest class of radiate animals, so



Sea Urchin.

named from the spines with which many of the genera are covered. Echinoidea are a class of echinoderms popularly known as sea urchins.

Ech'o, in Greek mythology, a nymph who detained Juno with endless speech, while Jupiter wantoned with the other nymphs. As soon as Juno understood the device, she ordained that she should not be able to speak until

some person had spoken to her, nor to be silent after anyone had addressed her. Through unrequited passion for Narcissus she pined away till nothing remained of her but her voice.

ECHO is also a term applied to reflection of sound from a distant surface. Several conditions must be fulfilled before an echo can be produced. The ear must be situated in the line of the reflection; and in order that the person who emits the sound may himself hear the echo, this line must be perpendicular to the reflecting surface, but if there are several such surfaces the sound may be brought back by a series of oblique reflections. The opposing surface must be at a certain distance from the ear, for if the directed and reflected sounds succeed each other with great rapidity, they are confounded. Thus vaulted caves and large rooms have a strong resonance, but produce no echo. Walls or buildings approaching the elliptic form return sounds with great force and distinctness. In St. Paul's Cathedral, London, the faintest sound is conveyed from one side of the "whispering gallery" to the other, but is not heard at any intermediate point. Some echoes are remarkable for their frequency of repetition. An echo in the Simonetta palace, near Milan, is said to repeat the report of a pistol sixty times. The number of syllables that any particular echo will repeat depends on the distance the sound has to traverse; an echo in Woodstock Park, England, repeats seventeen syllables. An interesting echo is found in the Hall of Statuary, in the Capitol at Washington.

Echo Cañ'on, ravine or defile in Summit Co., Utah; visible to passengers on the Union Pacific Railway; 975 m. from Omaha; inclosed between high vertical walls of rock of great grandeur and beauty.

Eck, Johann, 1486–1543; German theologian; vigorous Roman Catholic opponent of Luther; b. Eck, Swabia; Prof. of Theology at Ingolstadt from 1510 until his death. His most famous encounter with Luther was at Leipzig, 1519. He prepared a German translation of the Bible as a rival of that of Luther, 1537.

Eck'art. See ECKHART.

Eck'hardt, according to German legends, a personage who appears on the evening of Maundy Thursday to warn all persons to go home, that they may not be injured by the headless bodies and two-legged horses which roam the streets on that night.

Eckhart, Johannes, called MEISTER ("Master") ECKHART, abt. 1260–1327; German mystic; b. Thuringia; became vicar-general of the Dominican friars in Bohemia; taught in Paris, 1311–12, and later in the theological school at Strassburg; 1327, provincial in Cologne. He introduced many reforms into the monasteries; attracted great attention to his sermons, twenty-eight sentences in which were condemned in a papal bull soon after his death; has been called the "father of modern pantheism."

Eck'mühl, village of Bavaria, 13 m. SSE. of Ratisbon. Here, April 22, 1809, Napoleon defeated the Austrian Archduke Charles, who lost 5,000 killed and wounded, besides 7,000 prisoners.

Eclec'tics, class of ancient philosophers who professed to select the good and true from all systems. The eclectic system reached its height under Ammonius Saccas, who blended Christianity with Platonism. Victor Cousin used the term eclecticism to represent his own philosophical system. The term is also applied in the U. S. to members of a school of medicine who profess to adopt the best, in medicines and treatment, from all other schools.

Eclipse', in astronomy, the obscuration of one celestial body by another, or by its shadow. Eclipses are divisible into three classes, *viz.*: (1) the obscuration of the sun by the moon, called a *solar eclipse*; (2) the obscuration of the moon by the shadow of the earth, a *lunar eclipse*; and (3) the obscuration of a satellite of a planet by the shadow of the primary, called the *eclipse of a satellite*, as distinguished from an occultation of the satellite, by which is to be understood the disappearance of the satellite behind the body of the primary.

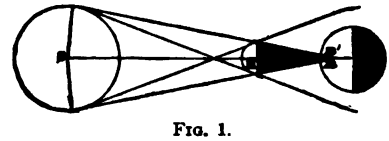


FIG. 1.

The moon revolves around the earth in about a month, and at every new moon passes nearly between the earth and the sun. If the plane of the moon's orbit coincided with that of the ecliptic, the moon would pass exactly between the earth and the sun at every new moon, and we should have an eclipse of the sun every month. The moon would also pass through the shadow of the earth at every full moon, and thus we should have a monthly eclipse of the moon, but the moon's orbit is inclined about five degrees to the ecliptic, so that the moon generally passes above or below the sun

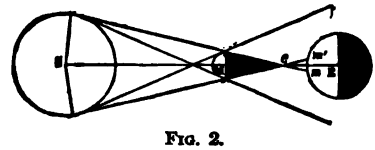


FIG. 2.

at new moon, and above or below the shadow of the earth at full moon. But the orbit of the moon necessarily intersects the ecliptic at two opposite points, called nodes. If the sun happens to be near the line of the nodes at the time of any new moon, then there will be an eclipse of the sun; and if the approach takes place at full moon, there will be an eclipse of the moon. If an observer is within the dark region, between *m* and *m'* (see Fig. 1), the light of the sun will be completely shut off by the body of the moon. This dark region is called the umbra. In Fig. 2 it is

represented as ending at the point *e*. Beyond this point the moon seems smaller than the sun, and the light of the sun can never be completely cut off, but it happens that this point of the umbra reaches, on the average, very near to the surface of the earth. If the shadow comes to a point before reaching the earth, as represented in the second diagram, then there will be a region, *m m'*, within which the moon will be seen projected nearly centrally on the sun, but the apparent diameter of the sun being the larger, the edge of its disk will be seen as a ring around the dark body of the moon. This is called an annular eclipse of the sun, and its duration ranges from a few seconds up to seven or eight minutes.

The principal total eclipses of the sun visible in the N. hemisphere from the year 1911 to 1923, inclusive, are the following:

April 28, 1911, total eclipse will be visible in the Pacific Ocean.

October 10, 1912, the moon's shadow will cross S. America from Peru to Brazil.

August 21, 1914, the shadow will pass across Norway and Sweden, through Russia and Persia, and continue its course nearly to India.

February 3, 1916, the shadow will pass near the Isthmus of Panama into the Atlantic Ocean, and cross it nearly to England.

June 8, 1918, the shadow will cross the N. Pacific Ocean, strike the coast of America near Vancouver's Island, and pass in a SE. direction over the whole U. S., reaching to Florida, where it will enter the Atlantic and terminate.

September 10, 1923, the shadow will enter upon the Pacific Ocean, and cross the S. part of California and Texas, where it will enter the Gulf of Mexico. See OCCULTATION; TRANSIT.

Eclip'tic, in astronomy, the great circle of the heavens which the sun appears to describe in its annual revolution. It is the circle to which longitudes and latitudes in the heavens are referred. From time immemorial the ecliptic has been divided into twelve equal parts, called signs of the Zodiac: Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, and Pisces. These signs, however, do not coincide with the constellations of the same names. The plane of the ecliptic is that passing through the center of the sun and the earth's orbit around the sun. The angle which this plane makes with the plane of the equator is called the obliquity of the ecliptic, and is a variable quantity—about 23° 27′ 30″. The change of seasons is a result of this angle.

École des Beaux Arts (ā-kōl' dā bō zăr), the French national school of fine arts founded 1648 by Cardinal Mazarin. Instruction is free to all students between the ages of fifteen and thirty. There are about 1,300 on the rolls, mostly French, though the U. S. sends more students than any other foreign nation. The grading of the students is determined by a series of competitions, which culminate in the *prix de Rome*, a scholarship founded in 1666 and open to all French artists. The winner receives an allowance and resides for two years at least at Rome engaged in the study of antique art.

Econ'omy, village in Beaver Co., Pa.; on the Ohio River; 17 m. NW. of Pittsburg; seat of a German socialist community founded by George Rapp, the members of which are best known as Harmonists. Pop. (1900) 1,062.

Economy, Polit'ical. See POLITICAL ECONOMY.

Ec'stasy, morbid mental state which, by reason of its temporary nature, does not amount to insanity, but, while it lasts, diminishes or alters consciousness and destroys self-control. The history of religion furnishes many examples of this aberration—the dancing epidemics in Germany and Italy in the Middle Ages, the Jansenist convulsionists in Paris in the eighteenth century, etc.

Ectozo'ön, parasitic animals which live on the outside of other animals, such as lice and ticks, and the crustaceans found on fishes and whales.

Ecuador (ĕk-wă-dōr'), republic of S. America; bounded N. and NE. by Colombia; S. by Peru; W. by the Pacific; area, including the Galapagos Islands, 116,000 sq. m.; capital, Quito; pop. (estimated) 1,205,600. The Andes traverse the country nearly from N. to S. in two parallel chains inclosing an elevated region or plateau. The W. chain, known as the Cordillera, contains the highest peak in Ecuador, Chimborazo, 20,496 ft.; Cotopaxi, in the E. range, is the highest active volcano in the world (19,614 ft.). The most important rivers are the Guayaquil or Guayas, Esmeraldas, Paztaza, and Napo. The climate of the coast region is hot and damp; of the plateaus, temperate and pleasant; of the flanks of the Andes and the adjacent plains, perhaps the most humid in the world. Minerals include gold, silver, quicksilver, copper, zinc, iron, salines of considerable value, pitch and sulphur. Agriculture and cattle raising are almost the only industries; coffee, cacao, and sugar are cultivated and exported; other leading exports are cocoa, hides, straw hats, and ivory nuts. There is one railway, 125 m. in length.

Ecuador is a centralized republic. The executive consists of a president and a vice president, chosen by universal suffrage for four years, and not eligible for immediate reëlection. Congress consists of a senate and an assembly. The power of the president is much restricted. The Roman Catholic is the state religion and the only one tolerated. Education is compulsory and free. There are superior intermediate and primary schools, besides seminaries and commercial and technical schools at Quito and Guayaquil. There are also university bodies in Cuenca and Guayaquil. The Univ. of Quito was established 1684. The bulk of the population is Indian; the number of those of mixed Indian and European blood is abt. 400,000. Principal cities and towns, Quito, Guayaquil, Cuenca, Riobamba, and Latacunga.

Abt. 1590, Huayana Capac, Inca of Peru, conquered the Indian tribes of Ecuador, and left the country to one of his sons, Atahualpa. In 1534 the Spaniards conquered the country,

which became a presidency (often called the Kingdom of Quito) under the Viceroy of Peru at Lima. In 1822 Gen. Sucre defeated the Spaniards and freed Ecuador, which was soon united to Colombia. In 1631 Quito separated from Colombia and took the name of Republica del Ecuador.

Ecumen'ical, universal; applied to councils of the Christian Church in which all parts of the world are represented. See COUNCILS, ECUMENICAL.

Ec'zema, commonly called SALT RHEUM, a vesicular disease of the skin, characterized by watery blisters smaller than those of herpes and larger than such as are sometimes seen in the difficulty known as "prickly heat." Eczema is often accompanied by intense itching, and is frequently transformed into a pustular or scabbing disease. It is generally chronic. Its treatment is both local and general. The local treatment, when the epidermis is thickened, is by alkaline applications with or without tarry or astringent admixtures. The "benzoated ointment of oxide of zinc" is an excellent application. If the system has received a specific taint, the iodides, with mercury judiciously used, are indispensable, and produce the happiest results. Arsenic in small doses is an extemely useful tonic in many cases. Change of air and visits to thermal and other springs and baths, though not strictly curative, often appear to be wonderfully palliative.

Ed'da, term applied to two entirely different monuments of the Old Norse literature: I. "The Prose Edda," also called "The Younger Edda" and "Snorri's Edda," is a work intended as a manual of mythology and poetry for the use of young skalds. To it alone is the name "Edda"—*i.e., ars poetica*—given with propriety. In its original form it was mainly the work of the Icelander Snorri Sturluson, 1178–1241, the most eminent skald of the decadence. II. "The Poetic or Elder Edda," also called "Sæmund's Edda," is a miscellaneous collection of Old Norse poems, mythological, heroic, satirical, and didactic, with some bits of prose. These vary much in style, but most of them are in strong contrast to the labored artificiality of what is known as the skaldic poetry. Some of them are found elsewhere, and the terms "Edda" and "Eddaic" (or "Eddic") are often extended to include other Old Norse poems.

Ed'dy, Mary Baker Glover, 1821– ; founder of the Christian Science denomination; b. Bow, N. H.; married, 1843, George W. Glover, and, 1853, Daniel Patterson, from whom she separated in 1873. She began teaching Christian Science, 1867; organized the First Church of Christ, Scientist, in Boston, the "mother church," 1879; ordained to the Christian Science ministry and established the Massachusetts Metaphysical College in Boston, 1881; founded *The Christian Science Journal,* 1883; published "Science and Health with Key to Scriptures," 1875; "Retrospection and Introspection," "Christian Science *versus* Pantheism," "Christian Healing," etc.

Eddy'stone Light'house. See LIGHTHOUSE.

Edelweiss (ā'dĕl-vīs), white, woolly, perennial herb belonging to the Composite family, and closely related to the common American plants known popularly as "everlasting," or "ladies' tobacco"; is cultivated in gardens in the U. S. and Europe.

E'den (Hebrew, "delight"), in Genesis, the region including the garden where at first dwelt Adam and Eve, and whence they were expelled for disobedience. Much discussion has prevailed among critics as to the country where this early paradise was situated. At present the choice appears to lie between Armenia and Babylonia, with a preponderance of argument and authority in favor of the latter. The difficulty consists in identifying the four rivers mentioned in the biblical narrative.

Edenta'ta, order of mammals having no teeth in the front portion of the jaws; teeth, when present, all of the same general form, without enamel, and, with the exception of Tatusia, growing continuously throughout life. The existing members of the order are the sloths, ant-eaters, armadillos, pangolins or scaly ant-eaters, and aard-varks or African ant-eaters. The extinct forms are the gigantic glyptodons and megatheria. The forms and habits of the various members of the order are diverse. The sloths dwell in trees and feed solely on leaves, the ant-eaters are terrestrial and live on ants and termites, while the armadillos burrow and eat both animal and vegetable food. No edentates, living or extinct, are found in Europe, the pangolins are restricted to parts of Africa and tropical Asia, and the two species of aard-varks are confined to Africa. S. America is the chief habitat of the group both in species and numbers, and but one species occurs so far N. as S. Texas, although fossils show that representatives of the order were once found in Ohio and Virginia.

Edes'sa, ancient capital of Macedonia; 46 m. NW. of Salonica; continued to be the burial place of the Macedonian kings after the court was removed to Pella. This site is occupied by the modern town of Vodena.

Edessa, or **Callirrhoe** (kăl-ĕr'ō-ē), ancient city of Mesopotamia, supposed to be on or near the site of Ur of the Chaldees, mentioned in Genesis, though by others identified with Erech, one of the principal cities of the Babylonian Empire; it was 78 m. SW. of Diarbekir; became the capital of an independent kingdom, 137 B.C., and a Roman military colony, 216 A.D.; was an important place in the early history of the Christian Church, and contained numerous monasteries; long the principal center of Oriental learning. The site is occupied by the modern town of Orfa.

Ed'fu (ancient *Apollinopolis Magna*), small town of Upper Egypt, on the W. bank of the Nile, about 60 m. above Thebes; has two temples, the larger on a grand scale. It was built chiefly by Ptolemy Philometor, 181–145 B.C.; the last King of Egypt noticed in sacred history; its entire length (including court and temple) is 451 ft.

Ed'gar, King of the English, 959–75; called EDGAR THE PEACEFUL, from the character of his reign, which was marked by the restoration of law and order and by the promotion of learning; ruled over Wessex, Northumbria, and Mercia, and forced the Danes of Ireland to acknowledge his overlordship.

Edgar the Ath'eling, abt. 1057; grandson of Edmund Ironside and heir to the English throne; b. Hungary; chosen king after the death of Harold, 1066, but the submission of the kingdom to William the Conqueror prevented Edgar's succession, and all attempts to regain the throne failed. He joined Robert, Duke of Normandy, against William Rufus, 1091, and against Henry I, but was taken prisoner by the latter at Tenchebrai, 1106.

Edge'hill, ridge in Warwick, England; 7 m. NW. of Banbury; scene of the first great battle of the Civil War, October 23, 1642. Prince Rupert, by a charge of cavalry, broke the left wing of the Parliamentarians, whom he pursued to Kineton, while the right wing of Essex's army defeated the Royalists. Thus the battle proved disastrous to both armies, and the loss was so nearly equal that neither party could claim the victory.

Edge'worth, Maria, 1767–1849; English author; b. near Reading; published novels, including "Castle Rackrent" and "The Absentee"; also "Popular Tales" and "Tales of Fashionable Life"; with her father wrote "Essay on Irish Bulls," "The Parent's Assistant," "Harry and Lucy," etc.

E'dict of Nantes (năntz), edict issued by Henry IV of France, April 13, 1598, to secure to the Protestants a legal existence within the French monarchy. They obtained permission to celebrate service wherever they already had formed communities, and to establish new churches wherever they chose, with the exception of Paris and the royal residences. They were also permitted to found universities or theological seminaries; nor should their faith be any impediment to their promotion to any civil or military office, etc. The Edict was revoked by Louis XIV, October 17, 1685; its revocation led to a renewal of the attacks which before the issuing of this edict had been made against the Huguenots. The depopulation caused by the sword was increased by emigration. About half a million of her most useful and industrious subjects deserted France, and brought away, together with immense sums of money, those arts and manufactures which had largely tended to enrich the kingdom. About 50,000 refugees passed over into England, and many more into Germany and America.

Edinburgh (ĕd'ĭn-bŭr-rō), **Prince Alfred Ernest Albert** (Duke of), Duke of Saxony and of Saxe-Coburg-Gotha, 1844–1900; b. Windsor Castle; second son of Queen Victoria; entered the navy, 1858, served chiefly on foreign stations; declined the crown of Greece, 1862; took a seat in the House of Lords, with the title of Duke of Edinburgh; married Grand Duchess Marie, only daughter of Alexander II of Russia, 1874; promoted vice admiral, 1882; made admiral in command of the Mediterranean squadron, 1886; succeeded his uncle as Reigning Duke of Saxe-Coburg and Gotha, 1893.

Edinburgh, capital of Scotland and of Edinburgshire or Midlothian; abt. 1 m. S. of the Firth of Forth; 399 m. NNW. of London; is divided into the Old and New Town, the former occupies the middle and highest of three ridges extending E. and W.; on the SE. border of the city a hill called Arthur's Seat rises to 822 ft. The principal street of the Old Town, bearing in different parts the names of Canongate, High Street, Lawn Market, and Castle Hill, is more than 1 m. long, and rises with a rather steep acclivity from Holyrood Palace at its E. end to the huge rock on which stands Edinburgh Castle, 443 ft. above sea level. In the New Town are three parallel avenues, Queen, George, and Princes streets. The most notable edifices and monuments are the castle, with capacity for 2,000 men; the Royal Palace of Holyrood, famous as the residence of Mary Queen of Scots; the cathedral of St. Giles, Victoria Hall, the Parliament House, and the monument erected to Sir Walter Scott. Other objects of interest are the old Tron Church, the Free St. George's Church, the Free High Church, the university buildings, the observatory, the National Gallery of Art, the Royal Institution, a chapel belonging to the ruined abbey of Holyrood (founded by David I abt. 1128), and the National Monument (an uncompleted imitation of the Parthenon) on Calton Hill, Edinburgh. It is distinguished for the number and excellence of its literary, scientific, and educational institutions.

By virtue of ancient charters and modern acts of Parliament Edinburgh is a royal burgh; has two ports on the Firth of Forth—Leith and Granton; became the capital of Scotland abt. 1436, when its castle was selected as the only place of safety for the royal household and the Parliament. Here occurred, 1843, the disruption of the Established Church, from the General Assembly of which 203 members seceded and organized the Free Church of Scotland. Pop. (1905) 336,577.

Edinburgh, Univer'sity of, famous institution of learning in Edinburgh, Scotland; founded by a charter granted by James VI of Scotland, 1582, and invested with all the privileges of other universities in the kingdom by the Scottish Parliament, 1621. In 1858 it became a corporation consisting of a chancellor, rector, principal, professors, registered students, alumni, and matriculants. About 3,000 students matriculate each year. The university comprises the faculties of arts, laws, medicine, divinity, science, and music. Women are admitted to the arts, divinity, and science classes, and to graduation in arts, science, and music on the same terms as men.

Ed'ison, Thomas Alva, 1847– ; American inventor; b. Milan, Ohio; began life as a train boy on the Grand Trunk Railway running into Detroit; learned printing, and soon was editing and printing *The Grand Trunk Herald* in the baggage car of the train on which he sold his wares; entered the employ of the Western

Union Telegraph Company, where he began the series of inventions which brought him world-wide fame. After brief stays in Cincinnati, Memphis, Louisville, and New Orleans he settled in Boston, where he invented his duplex telegraph, 1870; removed to New York City, 1871. In an immense and perfectly appointed laboratory, first at Menlo Park and later at W. Orange, N. J., a corps of skilled investigators, working under his direction, have reduced invention to an art. Machines for quadruplex and sextuplex telegraphic transmission, the microtasimeter, carbon transmitter, the phonograph, microphone, megaphone, incandescent lamp, and hundreds of minor inventions give him a unique position among inventors.

Ed'isto Is'land, island of S. Carolina; one of the most important of the Sea Island group; situated between the N. and S. Edisto Inlets; produces sea-island cotton.

Ed'monton, capital of the province of Alberta (created 1905), Canada; on the N. Saskatchewan River, 180 m. N. of Calgary, with which it is connected by rail; contains the weather-beaten Hudson Bay fort, the old Edmonton House, for many decades called the "Last House," the end of a trail, beyond which lay a trackless wilderness; now a flourishing city and railway center with important commercial interests. It has flour, lumber, and woolen mills, and is the center of the Canadian fur trade; easily worked coal seams exist in the near vicinity. Strathcona, a suburb, is the seat of the provincial university. Pop. 25,000.

Ed'mund I, abt. 922–46; King of the Anglo-Saxons; a son of Edward the Elder and a grandson of Alfred the Great; king in 941; conquered the Britons of Cumbria, and re-established "Watling Street" as the boundary between Wessex and the Danes; was assassinated by a robber; succeeded by his brother Edred.

Edmund II, surnamed IRONSIDE, 989–1016; King of England; son of Ethelred II, at whose death, 1016, the Danes possessed the greater part of England. Edmund waged war against Canute, and gained several victories, but was defeated at Assandun. The rivals then agreed to divide the kingdom, of which Edmund received the S. part. On his death, Canute became sole king.

Edmund, Saint. See RICH, EDMUND.

E'dom. See ESAU; IDUMÆA.

Ed'red, d. 955; King of the Anglo-Saxons; son of Edward the Elder; succeeded his elder brother, Edmund I, 946 A.D. St. Dunstan acquired an ascendency over Edred, and was his most powerful minister. Edred was succeeded by his nephew Edwy.

Educa'tion, in a general sense, the development and cultivation of all the powers—physical, mental, and moral; commonly, the training of the mind alone. Although modern educational institutions still lay the principal stress on mental training, there is much broadening along physical lines, with a recognition that the training of eye and hand, the proper development of muscle, and the intelligent direction of recreation are essentials in the process. The earliest form of education was doubtless wholly *practical*—a training in methods of obtaining food, self-protection, the building of shelters, etc. Next was added a *prudential* element—maxims embodying the net results of experience, together with religious training. The Greeks laid stress on physical training and preparation for a life of contemplation; the Jews developed the industrial side of education; the Phœnicians, the commercial. Until recently, Chinese education was merely a preliminary to the civil service.

These and other forms of education may be reduced to two main types—culture or the "humanities" and training for an industry or profession. The Greeks excelled in the former; the Romans in the latter, which has always been the popular form. The former is general—the latter, specific. The results of the latter are immediately visible; those of the former are vague and may be overlooked, though they bear more directly on the formation of character and habits of thinking. It has been generally held that the broader or cultural form of education should precede and lead up to the specific preparation for a profession or occupation; but of late, impatient at the time required for this double training, and doubtful of the immediate value of a purely cultural course, some educators have been endeavoring to find a system of training that will take the place of both, generally by so selecting the subjects to be taught in preparation for specific work that they will have cultural value. In the earliest phase of education in the U. S., the school and college training was almost purely cultural; preparation for a profession or occupation was carried on by actual practice, observation, and study with a person engaged in such occupation. Next came the establishment of professional schools, and later of trade schools, in some cases with their affiliation with the cultural institutions. Last of all has come the use of professional education as an instrument of culture, wholly or partially; either by the introduction into cultural courses of subjects looking definitely forward to the selection of some trade or profession, or by the shaping of purely professional courses in such fashion as to give them cultured value, real or imagined. The older cultural education was largely fixed; the subjects in it were all "required." With the recognition that a wider range of subjects possessed cultural value, and with the parallel attempt to make the cultural course more directly preparatory to the professional, came the splitting up of this course into many, with more or less choice on the part of the student, especially the institutions of higher learning. The multiplication of "optional" studies has now gone so far that a reaction seems to be setting in in favor of restricting it, and of so arranging the succession of studies that a desultory skipping about from one to the other shall be impossible.

Another conflict in educational methods, the older as well as the newer, has been between the mere training of memory and the develop-

ment of the powers of observation. Both were and are intended to lead to independent thought. In the older education a too great stress on memory and its development with a consequent tendency to an abuse of authority in the formation of opinion seemed to result in many cases in a sort of atrophy of thought. And even the modern training of observation, which is supposed to lead to reflection and reasoning, may, if stress is laid on the observation alone, result in much the same kind of atrophy, data being piled up as if for their own sake, without any attempt to use them. What is aimed at in all cases is doubtless correct and useful action, properly controlled by the mind; and to this end not only should memory be cultivated as well as observation, but the proper use of both in the collection of data and the employment of the reasoning powers in the classification of these data and the drawing of correct conclusions from them should be fostered. Thus a just equilibrium is maintained.

Generally speaking, ancient education affected only a select number of minds and left the masses untouched. Modern education aims at universality, at raising the average rather than the maximum. The older systems were content if they could produce one or two supreme successes amid many failures; the newer endeavor to make the failures as few as possible. The ideal is doubtless to combine the two aims—to see that no citizen is uneducated, and that those who are able to advance to the heights are given an opportunity to do so. To this end there is needed a comprehensive system of common schools, primary and secondary, and universities capable of teaching any required subject to any extent. Up to a certain point education should be compulsory and up to a certain higher point it should be free; the exact locations of these points are still subjects for discussion. Above all there should be such an adjustment that no training shall be given to him who is unfit for it. Owing to lack of means for such discrimination, or to lack of appreciation in some cases, perhaps, of the fact that it is needed, much valuable educational work is wasted on unfit persons, while many fit persons remain untrained or trained inadequately. An interesting sign of modern tendencies toward a more perfect universality in education is the way in which the modern free public library, a development of the past twenty years, is coming to be recognized as an educational institution. Its work is of more and more aid to those of school age, while it offers to those who have finished their formal education, an opportunity of directing that post-scholastic training which goes on through life whether we wish it or not, into a channel where the school education shall count for something, instead of being merely laid aside and forgotten. See COLLEGES; KINDERGARTEN; PEDAGOGICS; SCHOOLS.

Ed'ward, name of several kings of England: EDWARD I, THE ELDER, d. 925; King of the W. Saxons; son of Alfred the Great; succeeded his father, 901; the throne was claimed also by his cousin, Etherwald, supported by the Northumbrian and E. Anglican Danes, whom Edward fought throughout his reign, finally subduing them and gaining mastery over all the tribes from Northumbria to the Channel. His sons, Athelstan, Edmund, and Edred successively occupied the throne.—EDWARD II, THE MARTYR, abt. 962–78; King of the Anglo-Saxons; son of Edgar; succeeded to the throne, 975; was murdered in civil war raised by his stepmother Elfrida in interest of her own son Ethelred; succeeded by Ethelred II.—EDWARD III, THE CONFESSOR, abt. 1004–66; King of the Anglo-Saxons; son of Ethelred II, after whose death, 1016, Canute the Dane conquered England and married Edward's mother; spent his early life in Normandy; proclaimed successor of his half-brother Hardicanute, 1042; supported Malcolm in driving Macbeth from the throne of Scotland; gained his surname by his ascetic virtues; succeeded by his wife's brother Harold; was the last Saxon King of England; canonized in 1161.—EDWARD I, LONGSHANKS, 1239–1307; King of England in the Norman line; son of Henry III; supported his father in the war against the barons; went on a crusade to Palestine, 1271; succeeded to the throne, 1274; completed the conquest of Wales, 1282; invaded Scotland, conferred its crown on John Baliol, and, when the latter renounced his allegiance, gained a great victory at Dunbar, 1296, exiled Baliol, and made Surrey guardian of the kingdom. The Scots under Wallace drove the English out of their kingdom, 1297, but were defeated by Edward at Falkirk, 1298. Edward again invaded Scotland, 1303, captured Wallace, 1305, and was marching against Robert Bruce, who had been elected king, when he died near Carlisle. As king he promoted the improvement of law and reformation of civil abuses, confirmed the two great charters, and sanctioned the creation of the House of Commons; succeeded by his son, Edward II.—EDWARD II, 1284–1327; King of England; b. Wales; son of Edward I; created Prince of Wales, 1301; succeeded, 1307; recalled Piers Gaveston and made him guardian of the kingdom, whereat the nobles revolted and executed Gaveston, 1312; at head of large army marched against the Scots, was defeated at Bannockburn and fled the kingdom, 1314; again defeated at Blackmoor and pursued to York, 1321; fled to Wales; was captured, dethroned by Parliament, and assassinated in prison; succeeded by his son, Edward III.—EDWARD III, 1312–77; King of England; b. Windsor, son of Edward II and Isabella of France; proclaimed king in 1327, his father being in captivity; with large army marched against the invading Scots, but signed treaty recognizing independence of Scotland; later renewed the war and several times invaded Scotland in support of Edward Baliol's claim to the crown. He claimed the crown of France against Philip of Valois; made foreign alliances and invaded France, 1338, but returned without having fought; soon after he defeated a French fleet off Sluis, and unsuccessfully besieged Tournay and St.-Omer. In 1346 he gained over Philip the decisive battle of Crécy, which was followed by the siege and surrender of Calais and a truce that lasted till

1355. During this last campaign King David of Scotland invaded England and was captured; then Edward in retaliation desolated Scotland. The war with France was renewed in 1356, the heir apparent, Edward, the "Black Prince," gained a great victory at Poitiers and took King John prisoner, and in 1360 Edward signed the "great peace" at Brétigny, renouncing his claims to the crown of France. Charles V, successor of King John, renewed the war in 1370, and recovered nearly all the territory the English had retained. Edward was succeeded by his grandson, Richard II.—EDWARD IV, 1442–83; King of England; b. Rouen, France, son of Richard, Duke of York; became head of the house of York, 1460; continued its war against the Lancastrians; gained a victory near Northampton and took King Henry VI prisoner, 1460; gained another victory at Mortimer's Cross, entered London, and was proclaimed king, 1461. His marriage having offended the Earl of Warwick, the latter expelled him from the country, 1470, but he returned, 1471, defeated Warwick, recovered the throne, and ended the War of the Roses by the decisive victory at Tewkesbury, May 4, 1471; succeeded by his son, Edward V.—EDWARD V, 1470–83; King of England; b. Westminster, son of Edward IV; succeeded in 1483; was seized with his brother, the Duke of York, and imprisoned in the Tower by his uncle, the Duke of Gloucester, who made himself regent of the kingdom and usurped the throne as Richard III; Edward and his brother were supposed to have been murdered in the Tower.—EDWARD VI, 1537–53; third King of England of the Tudor dynasty; son of Henry VIII and Jane Seymour; succeeded in 1547, under the regency of his uncle, Edward Seymour, Earl of Hertford, subsequently Duke of Somerset. In this reign the government became entirely Protestant, removed images from the churches, repealed the "Bloody Statute," and promoted the Reformation. Somerset invaded Scotland to compel marriage between Mary Stuart and Edward; defeated the Scots at Pinkie, 1547; and was overthrown and executed by John Dudley, Earl of Warwick, 1550. Edward excluded the Princesses Mary and Elizabeth from the throne, and chose Lady Jane Grey his successor.—EDWARD VII, 1841– ; King of Great Britain and Ireland and Emperor of India; b. London; son of Queen Victoria and Albert, Prince Consort; succeeded in 1901; crowned, 1902. He was educated by private tutors, and after reaching his majority studied at Edinburgh, at Christ College, Oxford, and Trinity College, Cambridge. In 1860 he visited Canada and the U. S.; married, March 10, 1863, Princess Alexandra of Denmark; visited India, 1875–76. His first speech in the House of Lords, 1884, was in support of a measure for the better housing of the poor, and led to his appointment as commissioner to investigate the subject. He is democratic in his tastes, a patron of the stage, and widely known for his interest in all kinds of sports. His eldest child, Prince Albert Victor Christian Edward, Duke of Clarence, b. January 8, 1864, d. January 14, 1892. His second son, Prince George Frederick Ernest Albert, Duke of York, b. June 3, 1865, succeeded, on his father's accession to the throne, to the title of Duke of Cornwall. The younger children are Princess Louise Victoria Alexandra Dagmar, b. February 20, 1867, married the Duke of Fife, July 27, 1889; Princess Victoria Alexandra Olga Mary, b. July 6, 1868, and Princess Maud Charlotte Mary Victoria, b. November 26, 1869, who, July 22, 1896, married Prince Charles of Denmark, who became King Haakon VII of Norway.

Edward, Prince of Wales, surnamed THE BLACK PRINCE, from the color of his armor, 1330–76; eldest son of King Edward III; created Prince of Wales, 1343; commanded a part of his father's army in the battle of Crécy, 1346; gained a great victory at Poitiers, 1356; created Duke of Aquitaine, 1363. He supported Peter the Cruel in Spain; defeated the Castilians at Navarrete, 1367; stormed and captured Limoges and ordered every living creature in the city to be killed; his eldest son became King of England as Richard II.

Ed'wards, Amelia Blandford, 1831–92; English novelist and Egyptologist; b. London. Her novels include "My Brother's Wife," "Barbara's History," and "In the Days of My Youth." Her later years she devoted mainly to Egyptology and Egyptian exploration, being chief promoter and secretary of the Egyptian Exploration Fund, and publishing "A Thousand Miles up the Nile" and "Pharaohs, Fellahs, and Explorers." She also translated Maspero's "Egyptian Archæology"; contributed articles on Egyptology to the "Encyclopædia Britannica," and lectured in Europe and the U. S. on that subject.

Edwards, Jonathan, 1703–58; American clergyman and metaphysician; b. E. Windsor, Conn.; in 1727 became the colleague of his grandfather, Solomon Stoddard, in the pastorate of the Congregational Church, Northampton, Mass.; in 1729 sole pastor; by his powerful preaching caused "the great awakening," a revival that spread through New England. He opposed "the halfway covenant," which allowed unconverted persons to partake of the Lord's Supper, and to have their children baptized, and was forced to resign, 1755. In 1751 he became a missionary to the Housatonic Indians at Stockbridge, Mass.; in 1758, president of Princeton College, N. J. His works include his famous treatise, "On the Freedom of the Will," 1754; "Treatise concerning the Religious Affections," and "The Great Christian Doctrine of Original Sin Defended."

Edwards, Jonathan, 1745–1801; American clergyman; son of Jonathan Edwards, and commonly known as "the younger Edwards"; b. Northampton, Mass.; was pastor of Congregational churches at White Haven, and Colebrook, Conn., 1769–99; President Union College, Schenectady, N. Y., 1799–1801; published "Liberty and Necessity," and "Necessity of the Atonement."

Ed'wy, Ead'wig, or **Ed'win the Fair,** abt. 938–58; King of the Anglo-Saxons; succeeded

his uncle, Edred, in 955; drove the latter's chief counselor, St. Dunstan, from the country; his misgovernment provoked Mercia and Northumberland to revolt and to choose his brother Edgar for their king. On Edwy's death, Edgar succeeded to the throne of Wessex.

Eel, any one of many fishes of elongated and more or less serpentine shape, belonging to the *Anguillidæ*. The best-known species is *Anguilla anguilla,* found in both salt and fresh



COMMON EEL.

water on both sides of the Atlantic. The common eel is found from Maine to Mexico E. of the Rocky Mountains, and is spread over Europe S. of 64° 30′, and around the Mediterranean area, but it does not occur in the Danube or in the Black and Caspian seas; neither is it found in the Pacific.

Égalité (ā-găl-ē-tā′), one of the popular watchwords of the first French Revolution—"*Liberté, égalité, fraternité*" (Liberty, equality, fraternity). The Duke of Orleans assumed in 1792 the name of "Citizen Égalité," but was guillotined, nevertheless. See ORLEANS, LOUIS PHILIPPE JOSEPH.

Eg'bert, abt. 775–836; King of the W. Saxons; descendant of Cerdic; passed many of his early years at the court of Charlemagne, and began to reign, 800 A.D. At this date England was divided into three separate kingdoms, Mercia, Northumbria, and Wessex. He defeated the Mercians at Ellandun, 823, and soon afterwards completed the conquest of Mercia and Northumbria, ruled over all the states of the Heptarchy, and styled himself "the King of the English." In 835 he defeated an army of Danes who had invaded England; was succeeded by his son Ethelwulf.

Egede (ĕg′ĕh-dĕh), **Hans,** 1686–1758; Norwegian missionary; b. Harstad; labored in Greenland, 1721–36, then settled in Copenhagen, and was appointed superintendent, or missionary bishop of Greenland; wrote an account of his labors, and a description of Greenland. His son Paul, 1708–89, aided him; was made Bishop of Greenland, 1779; wrote an Eskimo dictionary and grammar, an Eskimo translation of the New Testament, and an "Account of Greenland."

Ege'ria, nymph in Roman mythology, one of the Camenæ, and a prophetic divinity from whom Numa derived religious inspiration. Numa had interviews with her in a grove, and when he died she melted into tears, which became a fountain.

Egg, specialized cell in the female of all animals set apart for sexual reproduction of the species. In its typical condition it is such a cell without accessory portions, but usually there are added various envelopes and substances for the protection and nourishment of the germ. In the eggs of the birds there is an outer calcareous shell perforated by minute holes for the passage of air, which later is needed for respiration; next within this is a tough (double) shell membrane, which contains the white or albumen. In the white, supported by a twisted membrane (chalazæa) at either end, floats the yolk, and on the upper side of the latter is a circular, lighter spot, the germ. The bulk of the yolk is nourishment, and is not directly, but as food, converted into the chick. In some forms eggs are capable of development without fertilization. The largest known egg is that of the Æpyornis of Madagascar, the shell of which has a capacity of about 2 gal. See illustration on following page.

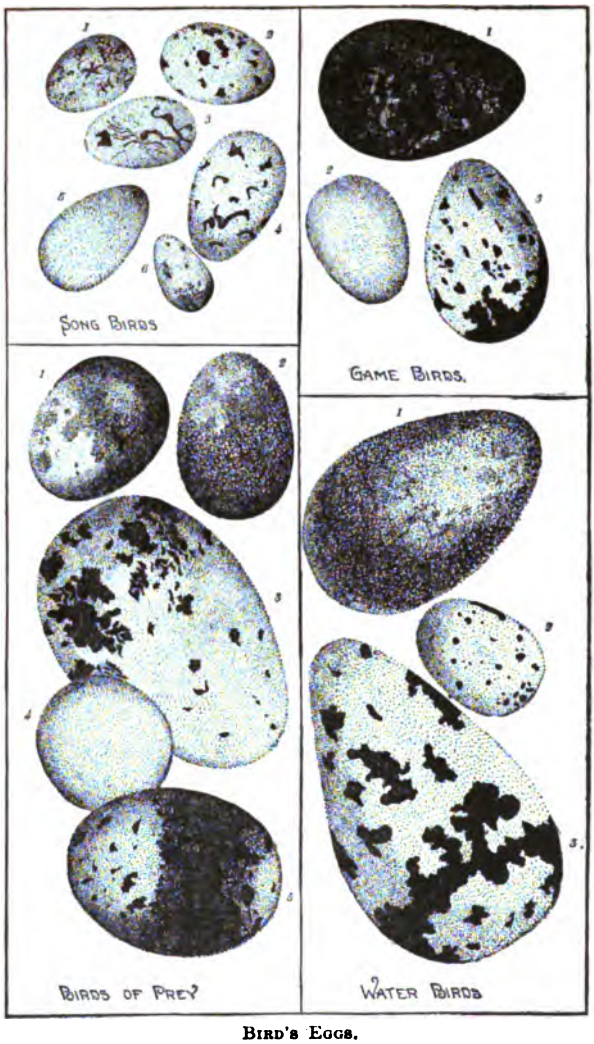
Egg'-bird, or Soo'ty Tern (*Sterna fuliginosa*), a bird belonging to the gull family, having the back and wings sooty black and the under parts white. The wings and tail are long and pointed, the latter deeply forked. It abounds in the W. Indian seas and in Florida, and was formerly so abundant that its eggs, which are laid in a slight depression in the sand, formed an article of commerce.

Egg'plant, a plant of the nightshade family, of the same genus as the potato. It is cultivated for its large fruits, which are eaten when cooked. Its native country is supposed to be India. It requires a long season for maturity, and is not extensively cultivated in the N. U. S. There are numerous varieties; the most popular are the large purple sorts; white-fruited varieties are not popular. In France the eggplant is known as aubergine, and in the S. U. S. it is sometimes called Guinea squash.

Eg'ga, large town and the most important trade center of Nigeria, Africa; on the right bank of the Niger; 70 m. above its confluence with the Benue; is a collecting point for the commodities of a wide region.

Eg'gleston, Edward, 1837–1902; American editor and author; b. Vevay, Ind.; preached as a Methodist minister in Minnesota; edited *The Little Corporal,* Evanston, Ill., 1866; founded *The Sunday-School Teacher* in Chicago, 1867; was literary editor of *The Independent,* New York, 1870–71; editor of *Hearth and Home,* 1871–72; preached in Brooklyn, N. Y., 1874–79. His works include "The Hoosier Schoolmaster," "The Circuit Rider," "The Graysons," "The Faith Doctor," "Household History of the U. S." "The Beginners of a Nation."

Eg'ham, village of Surrey, England; on the Thames; 18 m. W. of London and 3 m. SE. of Windsor. In the vicinity is the field of Runnymede, where King John and the barons held a conference, which resulted in the signing of Magna Charta, 1215. Here also is the Royal Holloway College for Women.



BIRD'S EGGS.

Song Birds.—1. Virginia redbird or rose-breasted grosbeak—white and brown. 2. King bird—whitish and brown. 3. Baltimore oriole—pale blue and dark brown. 4. Crow blackbird—bluish green and brown. 5. Wood thrush—greenish-blue. 6. Chippy—greenish blue and brown.

Game Birds.—1. Rock ptarmigan—Yellowish and dark red. 2. American quail—plain white. 3. Common snipe—ashy and brownish.

Birds of Prey.—1. Sparrow hawk—rusty and brown. 2. Pigeon hawk—reddish-brown, spots darker. 3. Turkey buzzard—white and chocolate. 4. Screech owl—white. 5. Swallow-tailed kite—white and reddish brown.

Water Birds.—1. Tropic bird—"crushed strawberry." 2. Least tern—whitish and brown. 3. Guillemot—bluish-white and chocolate.

Egi'na. See ÆGINA.

Eg'lantine, a species of rose sometimes called sweetbrier; is a native of Europe, and is naturalized in the U. S. The flower is single and fragrant. The leaves also emit a peculiar fragrant odor from their russet-colored glands. The plant sometimes grows 8 ft. high.

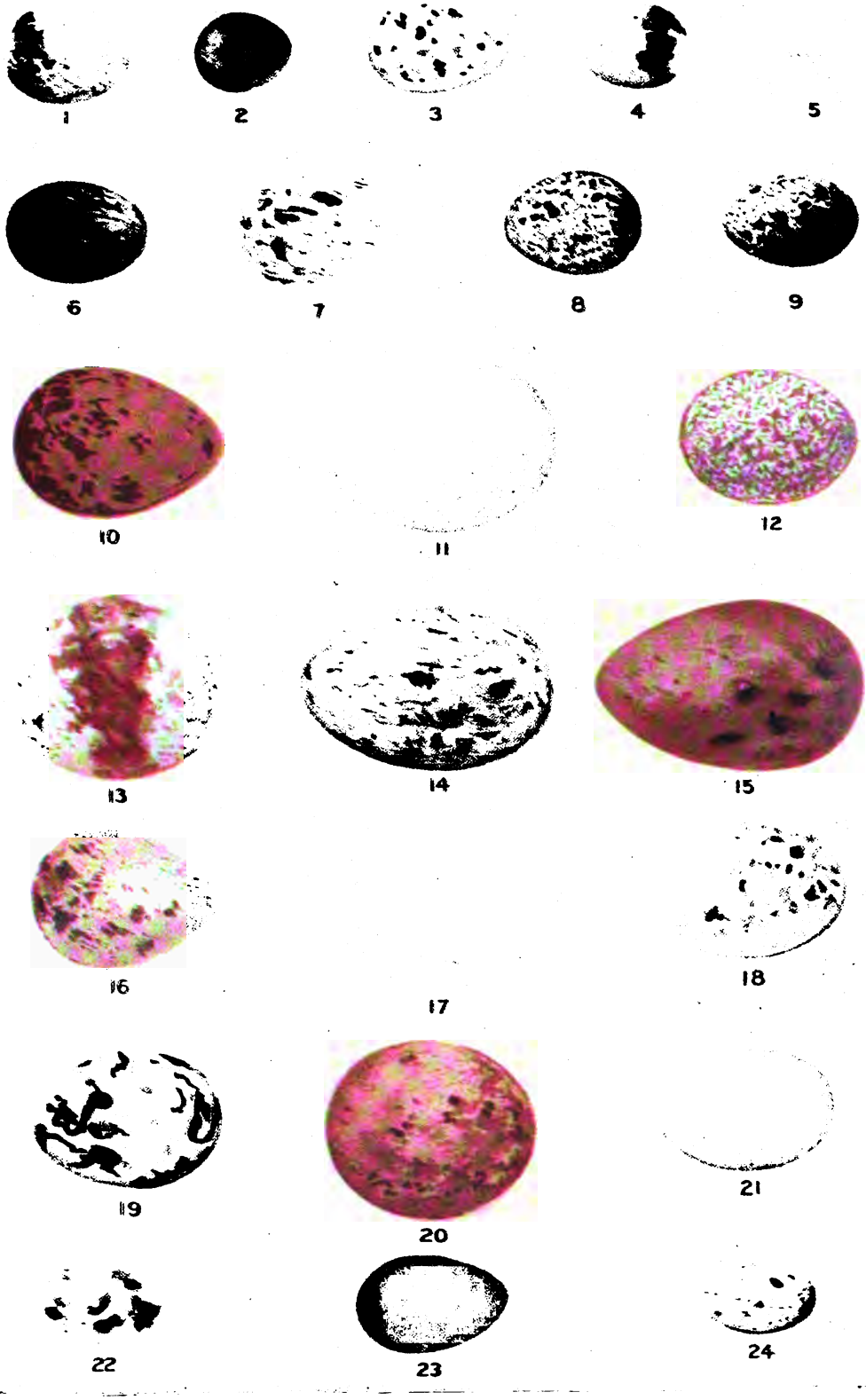
Eg'inhard, Eg'inard, or Ein'hard, 770–840; German historian; b. in what is now Hesse-Darmstadt; was a pupil of Alcuin. He gained the confidence of Charlemagne, who appointed him his secretary. He accompanied that emperor in his journeys and military expeditions. After the death of Charlemagne he passed into the service of Louis le Débonnaire. His wife was Imma, who in the twelfth century was confounded with Emma, a daughter of Charlemagne. His chief works are a "Life of Charlemagne" and "Annals of the French King."

Egmont', or Egmond', Lamoral (Comte d'), also known as Prince de Gavre, 1522–68; Flemish nobleman and general; b. Hainault; descended from the dukes of Gelderland; served in the armies of Charles V; in 1557 commanded the cavalry of the Spanish army, and defeated the French at St.-Quentin; gained a decisive victory at Gravelines in 1558; became a member of the Council of State in 1559. He opposed the intolerant and despotic policy of Philip II, but adhered to the Catholic Church. He ceased to act with the popular party after they revolted against the Spanish king, but the latter regarded him with jealousy and hatred, and sent the Duke of Alva to Flanders with vice-regal power, 1567. Egmont was arrested, tried for treason, and executed at Brussels.

E'gret, any one of several species of small herons which have, during the breeding season, a well-developed crest and the back adorned with long, loose, flowing plumes. The most beautiful are the white egrets, whose plumage is a pure white. Two species are found in Europe, and two very similar species are found in the warmer parts of America. The plumes of these birds are in great demand, and in many localities where egrets were formerly abundant they have been practically exterminated.

E'gypt, country in NE. part of Africa; bounded N. by the Mediterranean; E. by the Red Sea; S. by Nubia; W. by the Great Desert; area, excluding the Sudan, about 400,000 sq. m.; that of the Nile Valley and delta (Egypt proper) extending from the mouth of the Nile to the first cataract at Assouan, 12,976 sq. m. Its S. possessions extend to about the second cataract. Egypt is divided into two districts—Masr-el-Bahri, or Lower Egypt, and El-Said, or upper Egypt, comprising six governorships and fourteen provinces; capital, Cairo; chief port, Alexandria; pop. abt. 10,000,000.

TYPES OF BIRDS' EGGS



1. Ovenbird
2. House Wren
3. Cedar Waxwing
4. Wood Pewee
5. Humming Bird
6. Crested Flycatcher
7. Meadow Lark
8. Cowbird
9. Bobolink
10. Semipalmated Sandpiper
11. Green Heron
12. Night Hawk
13. Sharp-shinned Hawk
14. American Crow
15. Common Tern
16. Spotted Sandpiper
17. Screech Owl
18. Virginia Rail
19. Purple Grackle
20. Sparrow Hawk
21. Yellow-billed Cuckoo
22. Kingbird
23. Wilson's Thrush
24. Barn Swallow

Anglo-Egyptian Sudan, lost to Egypt, 1882–96, by the revolt of the Mahdi, now administered by a governor general appointed by Egypt, with the assent of Great Britain, extends S. from the frontier of Egypt to Uganda and the Belgian Kongo, and from the Red Sea to the confines of Madai, central Africa; area about 950,000 sq. m.; pop. 2,000,000. The Nile is the main irrigator of the country, watering and fertilizing annually a strip averaging about 7 m. in width, except at the N. where the valley broadens into the delta. The greater part of the country consists of deserts; that between the Nile and the Red Sea is intersected by chains of mountains, whose summits rise 6,000 ft. The most noted lake in Egypt is the Birket-el-Keroun in the Fayum, W. of the Nile, 30 m. long; along the seacoast of the delta is a series of lagoons, stretching nearly 200 m.

There are in Egypt few trees of any kind, except the palm, and few wild beasts. Average temperature of Lower Egypt 55° to 70°; that of Upper Egypt, 66° to 120° in winter; chief industry agriculture; principal crops, cotton, sugar, rice, wheat, maize, sorghum, barley, and vegetables. The manufacture of firearms, cotton, silk, and woolen goods is directed by the government. The chief exports are raw cotton, cotton seeds, cereals and vegetables, tobacco, provisions, and drugs. An extensive trade by caravans is maintained with the interior of Africa. The Suez Canal, the Mahmoudieh Canal from Alexandria to the Nile, and some 1,455 m. of railroads facilitate commerce. The prevailing religion of Egypt has been Mohammedan since 640 A.D. The Copts, however, 608,000 in number, are Christian descendants of the ancient Egyptians, and members of the Greek Orthodox Church. There are about 10,000 public schools, sixteen schools for higher education, besides mission schools and private European schools. The most famous university of Islam is the Univ. of El-Azhar, at Cairo, which has about 9,000 students.

Egypt, though nominally tributary to Turkey, is ruled by a monarchy conditionally independent, the administration being carried on by native ministers, subject to the ruling of the khedive. Since 1883 the government has been further popularized by providing for a legislative council, a general assembly, and various provincial boards. These bodies are chosen by restricted general suffrage; their powers are only advisory. The khedive pays an annual tribute to the Sultan and levies taxes in his name, but Great Britain practically governs the country. An English financial adviser has a seat in the council of ministers, and without his concurrence no final decision can be taken. The Turks, although the ruling class, form but a small portion of the population. The foreigners, chiefly Greeks, Italians, British, and French, number abt. 112,500. The Arabs make the larger part of the population, though the Copts number 608,000; chief cities, Cairo, Alexandria, Damietta, Tanta, Mansura, Zagazig, Assiout, Port Said, Fayum. As early as 5000 B.C. the Egyptians were a highly civilized people, with a fully organized society, a great proficiency in arts and manufactures. In the earliest ages they recognized only one God, but later became idolatrous and polytheistic. Each deity had an animal which was worshiped as his or her symbolic representative.

The government of ancient Egypt was a monarchy, limited by the influence of powerful hereditary classes (castes) of priests and soldiers. The first Egyptian dynasty was founded by Menes, 5004 B.C. Under the second, third, fourth dynasties the great pyramid of Sakkara (the oldest monument in Egypt), the three great pyramids and the sphinx at Gizeh were built. The third and fourth dynasties were of Memphis. With the tenth dynasty, nearly twenty centuries after Menes, what is called the old empire ended. The eleventh and twelfth dynasties were Theban. Abt. 2400 a rival line established itself in the delta, where it reigned for one hundred and eighty-four years and constituted the fourteenth dynasty. The Hyksos, or shepherd kings, whose hosts were led by Hittites, invaded the country abt. 2214, established their capital at Avaria, and founded the fifteenth, sixteenth, and seventeenth dynasties. Under the eighteenth dynasty, founded at Thebes, the Hyksos were expelled, the "new empire" began (1703), and Egypt became one of the great powers of the world. Under Rameses II, of the nineteenth dynasty, the pharaoh who oppressed the Israelites, Egypt declined in power, and was invaded by a N. race which seized the W. part of the delta. Menephtah, son of Rameses, who established his capital at Memphis, defeated the invaders. Shortly after, abt. 1300, occurred the exodus of the Jews. A rival dynasty, the twenty-first, arose at Tanis, in Lower Egypt and established authority over all Egypt. The twenty-second dynasty, was Assyrian. Psammetichus founded the twenty-sixth dynasty, expelled the Assyrians, made himself master of all Egypt, and allowed the Greek to colonize in the country.

In 527 Egypt became a Persian province. Abt. 405 the Persians were expelled and native monarchs ruled until 340, when Artaxerxes III of Persia reconquered the country. In 332 Alexander the Great conquered Egypt; after whose death his general, Ptolemy Soter, ruled, and after him nine Ptolemies. Alexander founded Alexandria, which became the chief center of Greek civilization. Augustus Cæsar reduced Egypt to a Roman province. For three centuries after that its history is a record only of fruitless rebellions and of savage persecutions of the Christians. In 1798 Bonaparte invaded Egypt and the French held it till 1801, when the British expelled them. Civil war followed, and Mehemet Ali, an Albanian adventurer, became ruler with the title of pasha. He subjected Nubia, conquered Syria and a great part of Asia Minor, and would have made himself master of Constantinople had not the powers intervened. His nephew, Ismail Pasha, negotiated immense foreign loans for internal improvements, and made taxes so oppressive that he was driven out, 1879. Mohammed Tewfik, son of Ismail, who succeeded him, found the finances in such confusion that the aid of European governments was invoked, and the British and French

govts. took control of all the sources of revenue. This led to a revolt in 1882, headed by Arabi Pasha, Minister of War, which was crushed by British troops. The control of the finances now passed into British hands and British troops remained in effective possession of the country. A revolt of the Mahdi in the Sudan occurred, 1881–85. Gen. Gordon, who had been sent by the English to withdraw the garrison at Khartum, was imprisoned in the city, and perished before the relief expedition under Wolseley arrived, January, 1885. This revolt lost to the khedive the Sudan, which was not recovered until 1896, when an Anglo-Egyptian expedition for the recovery of the lost provinces was dispatched under Lord Kitchener, who, in 1898, finally brought the Sudan under rule of the governments. In 1892 Abbas Hilmi succeeded to the throne on the death of his father, Mohammed Tewfik.

Egyp'tian Ar'chitecture, was one mainly of temples and tombs. Symbolic carvings, hieroglyphics, and paintings play a large part in its decorative scheme. The temples of Karnak, Luxor, Medinet-Abou, and Abydos, and the Ramesseum are the grandest examples of the art of the Ramesside epoch; Edfu, Denderah, and Philæ, of the Ptolemaic; while the temple caverns of Abu-Simbel and the innumerable rock-cut tombs of the Nile Valley exhibit another phase of Egyptian architecture, unrivaled unless by the cave temples of India. Limestone and granite, with a coarse sandstone for the rougher masses of masonry, and brick dried in the sun for exterior circuit walls, seem to have been the materials most in use.

Egyptian Vul'ture, called also PHARAOH'S HEN, small vulture of S. Europe, Africa, and Asia, occasionally seen in England. These birds are valuable scavengers, protected by law and custom, and are half domesticated.

Ehrenberg (ā'rĕn-bĕrkh), **Christian Gottfried,** 1795–1876; German naturalist; b. Delitzsch, Prussian Saxony; obtained a chair of medicine in the Univ. of Berlin; published "Scientific Travels through N. Africa and W. Asia" and "Physical Symbols of Birds, Insects, etc."; made interesting discoveries with the microscope, and published important works entitled "The Infusoria as Perfect Organisms" and "Mikro-Geologie." He discovered that cretaceous and other strata of great extent are composed of microscopic organisms.

Ehrenbreitstein (ā-rĕn-brīt'stīn), "honor's broad stone," fortified town of Rhenish Prussia; on the E. bank of the Rhine; opposite Coblentz; at the base of a rocky hill. On the summit of this hill stands the citadel of Ehrenbreitstein, on a rocky promontory 400 ft. above the water, inaccessible on three sides and defended on the N., the only attackable front, by a double intrenchment. It has been a fortress from very early times, its origin dating from the time of Drusus, when the Romans erected various castles and strongholds on the Rhine.

Eichberg (īk'bĕrg), **Julius,** 1824–93; American composer; b. Düsseldorf, Germany; in 1857 he came to New York, and in 1859 removed to Boston, where he established the Boston Conservatory of Music, 1867. He composed much for the violin, but is best known as the composer of the operas, "The Doctor of Alcantara," "The Rose of Tyrol," "The Two Cadis," and "A Night in Rome."

Eichhorn (īk'hôrn), **Johann Gottfried,** 1752–1827; German biblical critic; b. Dörenzimmern; Prof. of Oriental Languages at Jena, 1775; in 1788 called to the chair of Oriental and Biblical Literature at Göttingen, which he filled nearly thirty-eight years. He edited the "Allgemeine Bibliothek der biblischen Literatur," 1787–1801, and wrote numerous works, showing wide knowledge of Oriental and biblical antiquities; one of these is "Historical and Critical Introduction to the Old Testament."

Eider (ī'dėr), river of Germany, forming the boundary between Schleswig and Holstein; rises 10 m. SW. of Kiel, flows nearly W., and enters the German Ocean at Tönning; is 90 m. long, and navigable from its mouth to Rendsburg. A canal cut from Rendsburg to Kielfiord completes water connection between the Baltic and the North Sea.

Eider Duck, one of several species of sea ducks, especially the European eider, which furnishes eider down. This duck also occurs in the N. parts of N. America, but the common American eider and another species are found on the Pacific coast. The eider is larger than the common duck, and the plumage color



KING EIDER DUCKS.

in the male varies with the seasons. The female is of a light reddish brown, marked across with darker shades. The male displays in spring a conspicuous pied plumage of sable beneath and creamy white above, with a patch of shining sea-green on the head. During incubation the female deposits in her nest the down which she plucks from her breast, and if this is removed by hunters she furnishes another supply.

Eiffel (ī'fĕl) **Tow'er,** a tower erected on the grounds of the French International Exposition in 1889. It is 300 meters, or 984 ft., in height, of light structure and graceful form. Visitors are carried to the upper platform by

elevators. Meteorological observations are carried on at the top, affording very important results.

Eight-hour Day, a movement to fix by law or agreement between employer and workmen the hours of labor at not more than eight on any one day. The proposition arose in England in 1833, and its general adoption in Great Britain was moved at a trades-union congress in 1869. It has not, however, made great progress in that country. In the U. S. it was proposed in 1866 by the National Labor Union, and the eight-hour day was introduced into the U. S. navy yards by act of Congress in 1869, and the principle has been since applied to other workers by federal and state laws. It is in Australia, however, that the eight-hour day has been most generally followed, many trades having adopted it as early as 1856. The principal objection of employers to such a limitation of the hours of labor is based not only upon the increasing of the hours during which a factory remains idle, but upon the fact that the demand for an eight-hour day is usually coupled with the understanding that the day wage paid for longer hours shall still be the standard. But the general experience of employers that overtime work, even when stimulated by extra pay, is usually below the average, has been clinched by official statistics in Great Britain, which prove the output under the eight-hour régime is as great as it was when the working hours were longer.

Eimeo (ī'mē-ō), one of the Society islands; in the Pacific; 30 m. NW. of Tahiti.

Einbeck (īn'bĕk), town of Hanover, on the Ilme; 21 m. NNW. of Göttingen; has bleacheries and tanneries, manufactures of woolens and linens, and a gymnasium founded by Luther; prominent among the military towns of the old empire, but the French destroyed its walls, 1761. Pop. (1900) 7,914.

Ein'hard. See EGINHARD.

Einsiedeln (īn'sē-dĕln), town of Switzerland; canton of Schwytz; 24 m. SSE. of Zurich; has a famous Benedictine abbey, containing a black image of the Virgin Mary, which is visited by many pilgrims; contains a large library, and connected with it are a priests' seminary, gymnasium, lyceum, etc. Pop. (1900) 8,551.

Eisenach (ī'zĕn-ăkh), town of Saxe-Weimar, Germany; on the Hörsel; 48 m. W. of Weimar; inclosed by walls, and has a handsome ducal palace, now used as a courthouse, and a school of design; also has manufactures of cotton and woolen fabrics, art pottery, leather, carpets, soap, white lead, etc. Close by this town is the Castle of Wartburg, formerly a residence of the landgraves of Thuringia, and memorable as the refuge in which Luther remained secreted ten months, 1521–22. Pop. (1905) 35,153.

Eisenerz (ī'zĕn-ĕrts), also called INNERBERG, town of Styria, Austria; at the N. base of the Erzberg; 20 m. WNW. of Bruck. The Erzberg, which is 5,000 ft. high, is a solid mass of iron ore of rich quality. Mines have been worked here for 1,000 years. Pop. (1900) commune, 6,494.

Eisteddfod (ās-tĕth'vōd), congress of Welsh bards and musicians to promote cultivation of national poetry and music and maintain the traditions and customs of Wales. Its origin is ancient, probably antedating the Christian era, but the first meeting of which there is record was held on the Conway (N. Wales) in the sixth century.

Eject'ment, in law, an action for the recovery of the possession of lands, now generally used wherever the common law prevails for the trial not merely of the right to possession, but to the title.

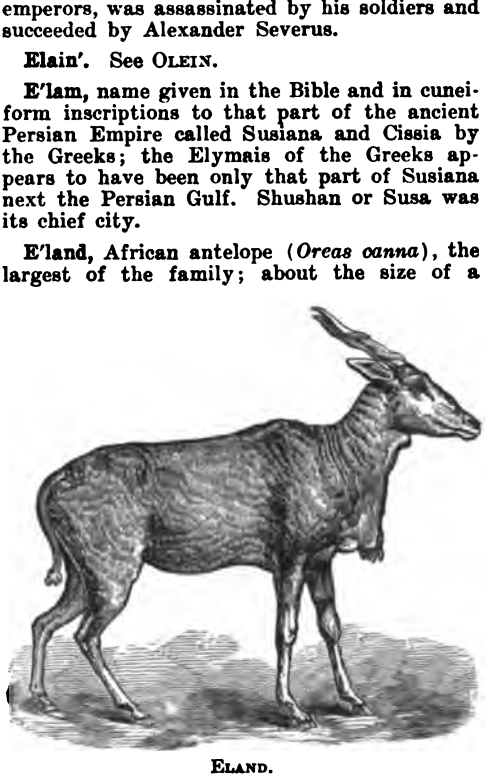
Ek'ron, a royal city of the Philistines, and seat of an oracle of Beelzebub; in Judea; 25 m. W. by N. from Jerusalem; site identified with the modern Akir.

Elagab'alus, or Heliogab'alus, 204–222 A.D.; Roman emperor; b. Antioch; original name Varius Avitus Bassianus, but on being appointed a priest of the Syrian god Elagabal, he assumed that name. Caracalla was assassinated April 8, 217, and Macrinus was proclaimed emperor, April 11th. Elagabalus was proclaimed emperor by the army in Syria, May 16, 218. A battle was fought between Macrinus and Elagabalus, June 8th, and Macrinus was put to death some days afterwards. Elagabalus, one of the most infamous of the Roman emperors, was assassinated by his soldiers and succeeded by Alexander Severus.

Elain'. See OLEIN.

E'lam, name given in the Bible and in cuneiform inscriptions to that part of the ancient Persian Empire called Susiana and Cissia by the Greeks; the Elymais of the Greeks appears to have been only that part of Susiana next the Persian Gulf. Shushan or Susa was its chief city.

E'land, African antelope (*Oreas canna*), the largest of the family; about the size of a



ELAND.

horse, measuring 5 ft. high at the shoulder, with two horns, nearly straight, about 1½ ft. long. In form it somewhat resembles the ox.

El-Araish (ĕl-ä-rīsh'), "garden of enjoyment," fortified town of Morocco; capital of province of Azgar; on the Atlantic coast, 45 m. SW. of Tangier; supposed to occupy the site of the ancient Roman town of Lixus, and on the opposite bank of the Wady El-Khos are the ruins of the Phœnician colony of Lex (or Lix). The fabled island and gardens of the Hesperides were supposed to be at the mouth of the river.

El Arish (ĕl ä-rēsh'), ancient *Rhinocolura*, walled town of Egypt; on the confines of Palestine, near the Wady el Arish; ½ m. from the Mediterranean; 195 m. NE. of Cairo. Before the rise of Alexandria this town was a great emporium of the Red Sea trade. The Wady el Arish is supposed to be the "river of Egypt" mentioned in the Bible. Pop. (1897) 16,991.

Elas'tic Curve, in mechanics, the figure which would be assumed by a thin horizontal elastic plate if one end were fixed and the other loaded with a weight. The curve assumed by a plate or beam when resting on two supports and loaded is also an elastic curve, provided the load be not so great as to impair the elastic properties of the material.

Elastic, Gum. See RUBBER.

Elastic'ity, property possessed by certain bodies of recovering their original form and size after withdrawal of the external force by which they have been compressed. Matter is believed to be composed of molecules or small particles, acting and acted upon by attractive and repulsive forces, from whose combined action result the various forms and properties of matter. When the body is at rest the opposite forces which any of its molecules exercise on each other are in equilibrium. If the distance between the molecules be increased within the limits of the action of the forces, both forces are diminished; and if the distance is lessened, both are increased, but not in the same proportion. Solid bodies are imperfectly elastic, and do not entirely recover their form when the disturbing force is removed; but there seems to be no limit to the elasticity of gases. See PNEUMATICS; STRENGTH OF MATERIALS.

Elastic Lim'it, limit to which a body can be strained and yet recover its original shape when the strain is removed. A strain carried beyond this causes permanent deformation.

Elastic Tis'sue, form of fibrous tissue, sometimes called yellow fibrous tissue, which may be drawn out to twice its original length, to which it returns when released. It is found in the membranes which connect the cartilaginous rings of the windpipe and various other structures requiring elasticity. In the human body perhaps the most remarkable example of the elastic tissue is seen in the *ligamenta subflava*, or ligaments between the vertebræ (bones of the spinal column). Almost all other ligaments are unyielding and inelastic, but these are extremely elastic. Their action is to help restore the column to its vertical position when bent by muscular action.

Elate'rium, drug obtained from the *Ecbalium elaterium*, or wild cucumber, called also squirting cucumber; is contained in the thick green mucus surrounding the seeds; is a powerful hydrogogue cathartic, dangerous when used in excess, and is very irritating to the eyes and skin. The active principle called elaterin is obtained from it. Elaterium is sometimes used in dropsy.

E'lath, town mentioned in the Bible; at the foot of the valley El Ghor in Idumæa, and at the head of the Elanitic arm of the Red Sea (the Gulf of Akabah); 10 m. E. of Petra; conquered by King David, and under Solomon became the center of much trade; continued to be an important seaport under the Romans.

Elba (ĕl'bä), island of Italy; in the Mediterranean Sea, between Corsica and Tuscany; separated from the latter by a channel 6 m. wide; is about 18 m. long; area, 87 sq. m. The surface is mountainous and contains excellent iron ore; among its products are wine, wheat, olives, and various fruits. By the Treaty of Paris this island was designated as the residence of Napoleon I, who removed to it May 4, 1814, and secretly left it February 26, 1815. Capital, Porto Ferraja. Pop. (1901) 24,213.

Elbe (ĕlb), river of Germany; rises in Bohemia, among the Riesengebirge Mountains; drains the N. part of Bohemia, intersects Saxony and Prussia, and enters the German Ocean near Cuxhaven; at this point the tide rises about 10 ft.; total length, 725 m. This river is several miles wide at every point between its mouth and Altona, a distance of nearly 70 m. Its principal affluents are the Havel, Moldau, Saale, and Eger. The chief towns on its banks are Dresden, Magdeburg, Hamburg, and Altona.

Elberfeld (ĕl'bĕr-fĕlt), town of Rhenish Prussia; on the Wupper; 16 m. E. of Düsseldorf; has a normal school, asylum for the deaf and dumb, museum, public library, and extensive manufactures of iron, paper, silk stuffs, velvets, cotton fabrics, merinos, ribbons, and tapes. Pop. (1905) 162,853.

Elbeuf (ĕl-bŏf'), town of France; department of Seine-Inférieure; on the Seine, 12 m. above Rouen; has important manufactures of fine flannels, billiard-table covers, habit cloths, checkered stuffs, woolen fabrics, chemicals, machinery, etc. Pop. (1900) 19,050.

El'bing, fortified town of Prussia; on the Elbing River; 5 m. from its entrance into the Frische Haff, and 40 m. ESE. of Dantzic; has manufactures of cotton and linen fabrics, sailcloth, soap, tobacco, leather, etc., foundries, dye and print works, and sugar refineries. Pop. (1900) 52,510.

El Bostan'. See ALBISTAN.

Elbruz (ĕl-brōz'), or **Elburz',** lofty range of mountains extending over the N. of Persia; connected E. and W. with the Paropamisan and Caucasian ranges; highest peak, the volcano Mt. Demavend, 18,600 ft. The highest summit of the Caucasus range, 18,570 ft., is also known as Mt. Elbruz.

El Caney (ĕl kā'nā). See CANEY.

El'der, overseer, ruler, or leader; the title of an officer both in the Jewish and Christian churches. In the ancient Jewish polity, elders were persons noted for their age, experience, and wisdom; in primitive Christian assemblies elders held the first place; in the Presbyterian churches the elders of a particular church, in conjunction with the minister, form the church session, the representative and governing body.

Elder, shrubby plant belonging to the honeysuckle family. The common elder of N. America grows from 5 to 10 ft. high. Another American species is the red-berried elder, found in rocky woods and among mountains. Elderflower water, employed in perfumery, is distilled from them, and wine is made from the berries.

El'don, John Scott (Earl of), 1751–1838; British jurist; b. Newcastle, entered Parliament, 1783, and supported Pitt; Solicitor-General, 1788; Attorney-General, 1793; prosecuted Horne Tooke and others accused of treason, but they were defended by Erskine and acquitted. In 1799 he was made Chief Justice of the Court of Common Pleas, and raised to the House of Peers as Baron Eldon; was Lord Chancellor, 1801–27.

El Dorado (ĕl dō-rä'dō), in Spanish, "the gilded," fabled king of an equally fabulous Indian city, long supposed to exist in the N. part of S. America. In its most definite form the story described a lake in which was an island with a city marvelously rich in gold, silver, and precious stones. The chief or "king" of the city was daily or periodically anointed with thick oil, in which gold dust was stuck until he appeared to be covered with the metal. This king was "El Dorado" of the Spaniards, and the name has been erroneously transferred in common language to the supposed city or region which he governed. Many expeditions, including one under Walter Raleigh, went in search of the city.

El'eanor of Aquitaine', abt. 1122–1203; Queen of France, and later of England; daughter and heiress of the last Duke of Aquitaine; married, 1137, to Louis VII of France, with whom she went to the Holy Land, 1147; was divorced from Louis, 1152, and soon married to Henry II of England. She instigated her sons to rebel against their father (Henry II), who imprisoned her for fifteen years; acted as regent while her son, Richard I, conducted a crusade to Palestine. Despite her wayward character she did much to further poetry and art.

Eleatic (ē-lē-ăt'ĭk) **School,** group of Greek philosophers, the first one being Xenophanes of Elea, who flourished abt. 530 B.C. They regarded as vain and illusory the world of change and succession. Time, space, and motion they considered as phantasms, caused by the deceiving senses, and incapable of scientific explanation. They distinguished between the pure reason—the correlative of being—and opinion or common understanding, which judges according to the impressions of sense. Parmenides and Zeno were the most celebrated disciples of Xenophanes.

Elea'zar ("God is help"), name of several ancient Hebrews, of whom the most important were the third son of Aaron, who succeeded him as high priest, and one of David's three "mighty men" in the wars with the Philistines.

Elecampane', plant of the Composite family. The common elecampane is indigenous to middle and S. Europe, and has become naturalized in the U. S. The root has sudorific and diuretic properties.



ELECAMPANE.

Elec'tion, in law, the choice of two alternatives; sometimes the right to make such choice. The law frequently imposes on a party the duty to choose between two inconsistent or alternative rights or claims. This obligation may present itself in all branches of the law, and often occurs as a rule of practice.

ELECTION, in politics, the choice of public officers by those persons who have the right of voting, as distinguished from appointment, which is such choice made by superior officers. Elections are direct when officers are chosen by a direct vote of their constituency; indirect when electors are chosen to designate the person who shall be the officer; for the leading case of the latter method, see ELECTORS.

Elections in the U. S. are divided into local or municipal elections, at which officers for some particular town or locality are chosen; general or state elections, at which officers for the whole of a commonwealth are elected (the most important being the gubernatorial and presidential elections for filling the places of Governor and President); and congressional or legislative elections, at which members of Congress or legislatures are voted for. See BALLOT; NOMINATING CONVENTION; NOMINATION; PRIMARY ELECTION.

ELECTION, in theology, has reference to the act of God in choosing some individuals as objects of mercy and salvation. According to Calvin, this election depends only upon God's pleasure; the Arminians consider that God chooses those whom he foresees will accept the offer of the Gospel and act as true Christians.

Elec'tor, title of those German princes who had the right or privilege of electing the emperor of Germany. There were originally (1256 A.D.) seven—namely, the Electors of Cologne, Mentz, Treves, Bohemia, Brandenburg, Saxony, and the Elector Palatine. The first three were

archbishops of Cologne, Mentz, and Treves. They usually chose the heir or near relative of the preceding emperor. On the dissolution of the Holy Roman Empire (1806) the office became obsolete, but the title was retained by the rulers of Hesse-Cassel till 1866, when that state was united to Prussia. See ELECTORS.

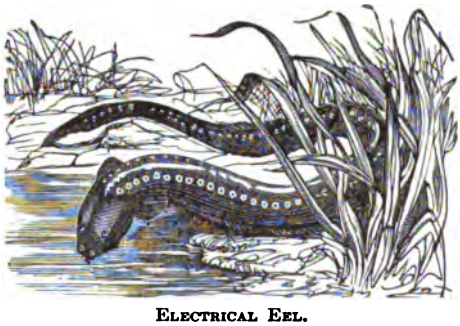
Elec'toral Col'lege. See CONSTITUTION OF THE U. S., Art XII, and ELECTORS.

Electoral Commis'sion. See PRESIDENTIAL ELECTORAL COMMISSION.

Elec'tors, in the U. S., persons chosen by the people of the several states to elect the President and Vice President. Each state chooses a number of electors equal to the whole number of members it sends to both houses of Congress. The electors must be chosen on the same day in all the states—that is, on the Tuesday next after the first Monday in November. The number of electors, 1907, was 476. For method of electing the President and Vice President, see CONSTITUTION OF THE U. S.

Elec'tra, daughter of Agamemnon, King of Mycenæ; sister of Orestes, and wife of Pylades; sometimes called Laodice. Her story is the subject of dramas by Æschylus, Euripides, Sophocles, and Racine. The most perfect of the ancient tragedies of "Electra" is that of Sophocles; in this she stimulates her brother Orestes (whose life she has saved from the violence of her father's murderers) to avenge the death of that parent. This he does, with the aid of Apollo. Five other persons of this name are found in Greek mythology.

Elec'trical Fish, a fish having the power of giving shocks of electricity. At least fifty marine animals of very diverse character are known to have this power. Among the best known are several species of *Torpedo* and *Narcine* (of the ray family), one of which is occasionally found on the Atlantic coast of the U. S. The *Electrophorus electricus*, a fresh-water eel of S. America, sometimes 6 ft. long, has the power of overcoming men, and even horses, by its tremendous shocks.



ELECTRICAL EEL.

Electrical Machine', machine for the electrostatic generation of differences of potentials, that is to say, for electrification by friction or by electrostatic induction. In frictional machines the body rubbed is a revolving glass plate (in early forms a cylinder or ball rubbed by the hand), passing between rubbers of soft leather to which a dressing of sodium amalgam has been applied. In all such machines, however, even under the most favorable conditions, a scarcely appreciable portion of the work done appears in form of electrical energy, the remainder being wasted as heat. For this and other reasons friction machines have gone almost entirely out of use, being replaced by a class of machines which produce electrification by electrostatic induction. There are many forms of such apparatus, the best known being



ELECTROPHORUS.

the "influence" machines of Holtz, Toepler, and Wineshurst, and the various forms of "replenisher" devised by Lord Kelvin.

The simplest of all electrical machines of this class is the electrophorus, which consists of a plate of vulcanite or of some other substance easily electrified by friction, and a metal disk with an insulating handle. When the disk is placed on the vulcanite surface which has been previously excited by rubbing with fur, it makes contact in three points of support only. Electrostatic induction brings about a difference of potential between the upper and lower faces of the disk, and when the former has been connected for a moment with the earth and insulated again and the disk removed. it comes away heavily charged. The charge thus obtained is always opposite in character to that residing on the vulcanite plate (*i.e.*, it is positive). The quantity of electricity on the plate is in no way diminished, and the process may be repeated again and again, without exhausting the original charge. The difference of potential produced by means of influence machines is very great (50,000 to 200,000 volts). It has been reached artificially by only one other device, the induction coil. As compared with machines for the development of electrical energy of moderate tension (dynamo machines, etc.), friction machines and influence machines are of exceedingly low economy. See DYNAMO.

Elec'tric Blow'pipe, device in which the electric arc between carbon pencils is powerfully deflected by means of an electric magnet and given the form of a blowpipe flame. The arc was used in this way by Werdermann for the fusion of very refractory minerals, etc.

Electric Discharge', phenomenon which takes place whenever the dielectric separating two conductors, between which difference of poten-

tial exists, breaks down. The result is in general a spark due to heat developed along the path over which equalization of potential occurs. When the conditions are such that considerable potential difference continues after the breaking down of the dielectric, the light continues and the discharge is an "arc." At low pressures the discharge is not a spark, but a continuous light, often called by the older writers the "barometric" light. It takes a new form, and undergoes a series of striking and beautiful modifications.

Electric Fur'nace, apparatus in which very high temperatures are attained by surrounding the electric arc, or sometimes a group of arcs, in parallel with carbon, lime, or other refractory substance under heat and poorly conducting electricity, so that an electric current will

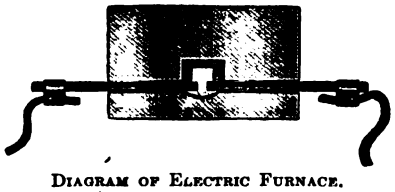
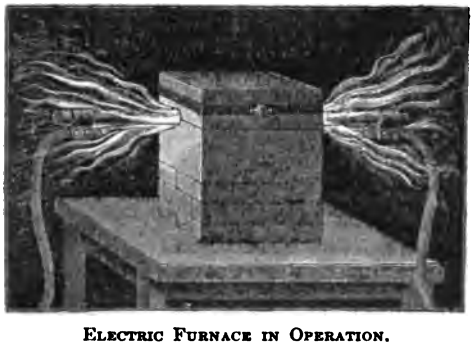


Diagram of Electric Furnace.

bring it to high temperature. In some forms a carbon pot is used, into which is inserted a heavy carbon pencil or a bunch of pencils, the bottom of the pot forming one terminal to the electric circuit. The material to be fused is placed between the end of the pencil and the bottom of the pot, surrounded with suitable fluxing material. Another form consists of two groups of pencils dipping diagonally into a furnace box, one group serving as a positive,



Electric Furnace in Operation.

the other as a negative terminal. The resulting temperatures reduce or decompose the most refractory ores, such as the oxides of aluminium and magnesium. A furnace of small size, consisting of two slender pencils inserted into a cylinder of lime, has been used for the reduction of rare metals, erbium, yttrium, etc.

Electric'ity, the name of a force, or property of matter, underlying a class of effects that have wide and increasing application in the industries and useful arts. The precise nature of electricity is unknown, but the numerous manifestations of energy it produces are generally recognized. It is believed to be a form of wave motion similar, in some respects, to light and heat. It may be produced by friction, chemical action, heat, and mechanical action. Amber, glass, hard rubber, and many other substances may be electrified or given a charge of electricity by rubbing them with a silk or woolen cloth, thereby causing them to attract pith balls, or other light bodies. This property of amber was mentioned by Thales, of Miletus, as early as 600 B.C. The electricity thus developed is called static electricity. These manifestations of static electricity are of the same nature as lightning, which is a discharge of electricity between two clouds or between a cloud and the earth. Static electricity is manifested principally in attractions and repulsions and violent discharges, one body being charged to a higher degree than the other, the discharge bringing about a state of equilibrium. Ether is the medium now supposed to fill all space, through which the vibrations of light, radiant heat, and electric action are propagated. Electricity in this form is called *static* to distinguish it from a



Fig. 1. Simple Voltaic Cell.

continuous passage of electrical energy from one point to another, caused by a continued difference of electrical pressure between two points, *i.e.*, a difference in the degree of such energy at the two points of a current, such as is produced by a battery or ordinary voltaic cell.

When any two bodies, between which a difference of electrical pressure exists, are connected by a suitable conductor, there is produced an effect which is commonly called an electric current. The two principal ways of producing an electric current are by chemical means, as in a battery or voltaic cell, and by electro-magnetic induction, as in the dynamo. A simple form of voltaic cell (see Fig. 1) may be made as follows: A strip of zinc and a strip of copper are placed vertically in a glass tumbler without touching each other. The tumbler is then nearly filled with a weak solution of sulphuric acid, and the two metal strips are connected by a copper wire. A current of electricity will flow through the wire from the copper to the zinc. The copper is called the positive pole (+) and the zinc the negative

(−) pole. Substances which will carry a current of electricity are called conductors. All metals are conductors of electricity, silver and copper being the best, in the order named. Carbon and water are also good conductors. Partial conductors are the human body, cotton, dry wood, marble, and paper. Among the best nonconductors, insulators, or dielectrics may be named oils, porcelain, wool, silk, resin, gutta-percha, shellac, ebonite, paraffin, glass, fused quartz, and air.

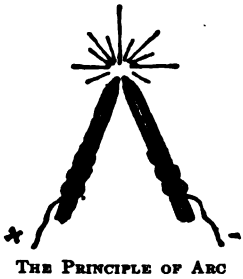
The flow of electricity through a wire is sometimes compared to the flow of water through a pipe. Water can be forced through a large pipe more easily than it can through a small one; so a current of electricity can be passed through a large wire more readily than through a small one. A greater quantity of water can be passed through a large pipe than through a small one under the same pressure, so a greater current of electricity can be forced through a large wire than through a small one under the same pressure. The resistance in a wire also increases as the length of wire or conductor increases, just as the friction in the flow of water is increased with the increase in the length of pipe. In the case of water, a certain pressure must be used to force it through a pipe; in other words, a difference of pressure must exist at the two ends of the pipe; so in the case of electricity, a difference of electrical pressure must exist between the two ends of the conductor. This difference of electrical pressure is called the electro-motive force or difference of potential, the pressure being called the potential. The electric current has both pressure and volume.

The *ohm* is the unit of measure of *resistance*. It is named after the German physicist S. S. Ohm (1737–1854), who discovered one of the fundamental laws of electricity, known as Ohm's law. The resistance of a conductor depends upon its size or cross section, length, and the material of which it consists. The resistance of a column of pure mercury, 106.3 cm. long and 1 sq. mm. in cross section, at a temperature of 0° C. has been accepted as this unit, and is called the ohm. The *ampère* (formerly called the "weber") is the unit of *current*. It is named after A. M. Ampère, French physicist (1775–1836). It is the amount of current which when passed through a solution of silver nitrate in water (15 parts by weight of nitrate to 85 parts water) deposits silver at the rate of 0.001118 of a gram a second. The *volt*, named in honor of Count A. Volta, an Italian electrician (1745–1827), is the unit of *pressure*, or electro-motive force (E.M.F.). It is that E.M.F. which applied to 1 ohm will produce in it a current of 1 ampère, that is, it is the E.M.F. necessary to send 1 ampère of current against a resistance of 1 ohm. The *coulomb*, named after C. A. de Coulomb, French physicist (1736–1806), is the unit of *quantity*. It is the quantity of electricity transferred by a current of 1 ampère in one second. When the quantity of electricity passing through a conductor is 1 coulomb a second the strength of the current is said to be 1 ampère. A current of electricity having an electro-motive force of 1 volt passing through a conductor having a resistance of 1 ohm is said to have a strength of 1 ampère. The ordinary 16-candle-power-110-volt incandescent lamps require a current of about ½ an ampère or ½ coulomb a second. The *watt*, named after the Scotch inventor, James Watt (1736–1819), is the unit of *power*. It is the power of a current of 1 ampère flowing under a pressure of 1 volt. It is equal approximately to $\frac{1}{746}$ of 1 horse power. The power of a current in watts is equal to the product of the electro-motive force (E.M.F.) in volts multiplied by the current in ampères, and is expressed mathematically W = E.C. A kilowatt is 1,000 watts. The *farad*, named after Michael Faraday, English physicist (1791–1867), is the unit of *capacity*. An electrical conductor, under suitable conditions, has a capacity to hold or accumulate a certain quantity of electricity. A condenser is a device made with extensive conducting surfaces separated from one another by an insulator or dielectric, as sheets of tinfoil separated by sheets of shellac paper. It has the property of retaining or holding a quantity of electricity in the form of a static charge. Hence it would then be said that a condenser has a capacity of so many microfarads, just as a vessel has a capacity of so many quarts. A microfarad is the $\frac{1}{1,000,000}$ of a farad. A quantity of 1 coulomb of electricity at a pressure of 1 volt is called a farad. The *joule* is the unit of *work*. It represents the energy expended in one second by a current of 1 ampère against a resistance of 1 ohm.

The energy of an electric current may be converted into various other forms of energy, such as heat, light, mechanical motion, and chemical energy. Many different effects may be produced. The effects of a discharge of electricity may be classified as follows: *Light* or *luminosity*, as in the electric spark; *heat*, as in fusing a wire or heating the filament of an incandescent lamp to a white heat; *mechanical*, as in lightning discharge; *physiological*, as in shock to the human body or bodies of animals; *electrolytic*, as in electroplating; *magnetic*, as in the electro-magnet. If a strong current of electricity be passed through a comparatively small wire, the wire will become warm or hot. If the resistance is great the wire will be melted or fused. The heating effect is proportional to the square of the current strength. At any point of the circuit it is proportional to the resistance with a current of the same strength. The heating effect of the electric current is utilized in firing cannon, exploding torpedoes, firing fuses in blasting operations, in electric welding, cauterizing, electric lighting, heating, exploding charges in the cylinders of gas and gasoline engines, and in many other ways. If a strong current of electricity is passed through two plates immersed in water by connecting them with the terminals of a battery or generator an effect known as electrolysis is produced; in other words, the water is decomposed or separated into its two elements, oxygen and hydrogen. Many other compound liquid substances can be separated by the use of the electric current in a similar manner. A substance that may

be decomposed by electricity is called an electrolytic. Electrolysis is made use of in electroplating. If an insulated wire be wrapped a number of times around a soft iron rod or bundle of iron wires and a current of electricity be made to flow through the wire, the iron rod will become magnetized and will remain so as long as the current is on. These magnetic properties will be lost the instant the current is broken. The iron rod is called the core, the wire as wound on the core the helix. The most familiar manifestations of the magnetic effects of electricity are those shown in the dynamo, motor, telegraph, telephone, and other kinds of electrical apparatus, which are dependent upon the electro-magnet for their operation. See ELECTRIC LIGHTING; GALVANISM; POWER, POLYPHASE TRANSMISSION OF; TELEGRAPH; TELEGRAPH, WIRELESS; TELEPHONE.

Elec'tric Light'ing, artificial illumination by bodies heated by passage of an electric current. It is of two types, *arc lighting* and *incandescent lighting.* The older is the arc, now generally used for outdoors or large spaces, owing to its high intensity. The electric arc is the conducting bridge of incandescent vapor formed when a circuit is broken by withdrawing two contiguous parts very slightly. It is highly luminous, the light proceeding not only from the vapor, but from particles carried over by the current and from the heated ends of the broken circuit (electrodes). In the ordinary arc light the electrodes are carbon rods, with a mechanism for maintaining them at a small, constant distance. When the carbons are saturated with certain salts, these volatilize and greatly increase the size and luminosity of the arc, which is then known as a "flaming arc." The color of the light in this case may be made white, yellow, or deep orange, by varying the salt used.



THE PRINCIPLE OF ARC LIGHTING.

Incandescent electric light proceeds from a thin filament raised to a white heat by the passage of the current. This is the best type for indoor lighting, as the candle power may be adjusted as desired, usually by making the filament long or short. If the filament, as is usually the case, is combustible, it must be inclosed in a glass bulb, from which the air has been exhausted. The manufacture of these lamps has thus made necessary the invention of machinery for obtaining vacua of high degrees of perfection. Until recently the only substance used for filaments was carbon made by charring vegetable fiber and treating it specially. Of late a variety of metallic filaments have been introduced, notably those of the metals tantalum and tungsten. These give light of high power and white quality, with low consumption of current, but lack strength and are somewhat easily broken. The *Nernst* lamp utilizes the principle of the Welsbach gas mantle. It has a "glower" of rare earths, whose phosphorescence adds to their light when the current passes. The lamp needs no surrounding vacuum, but as the glower conducts only when heated, auxiliary devices are necessary to start it, and it does not fully "light" until about a minute after turning on the current. Certain types of lamp, still more or less experimental, employ vapors in partially exhausted tubes as the incandescent body. In the Cooper-Hewitt mercury lamp the vapor of mercury is used. It gives a brilliant light of a peculiar vivid blue-green, which prevents its use for ordinary domestic purposes, but its cheapness makes it available in factories, etc., and its high actinic properties render it valuable in commercial photography. Another tube light is the Moore lamp, which as now made gives a soft light approximating rosy daylight, of low intensity. To light a room the tubing is usually arranged around the cornice. Electric illumination of all kinds is now greatly used for decorative purposes and for outdoor advertising, in combination with all sorts of mechanical devices, giving the chief streets of our cities a striking brilliancy that would have been impossible before its introduction.

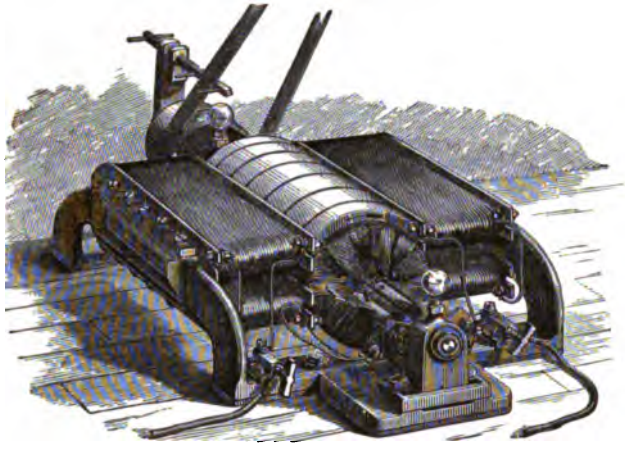


EDISON INCANDESCENT LAMP AND SOCKET.

Electric Me'ter, appliance for the measurement of the energy developed in an electric circuit. Such meters are of three kinds: (*a*) clockwork recorders, (*b*) chemical meters, (*c*) motor meters. In the first a known fraction of the current to be measured passes through a galvanometer which records by means of a stylus upon a chronograph sheet driven by clockwork. Large first cost and the difficulties of maintaining clockwork devices in continued use have kept this class of meters out of general use. Chemical meters are zinc voltameters, the plates of which are weighed from time to time. Motor meters are electric motors, the speed of which is recorded by a dial device like that of the gas meter.

Electric Mo'tor, machine for the conversion of electrical energy into the form of mechanical power. There are two great classes of electric motors, direct current and alternate current. Both alike depend on the simple law that a dynamo acts as a motor when a current from an external source is passed through its armature in a sign opposite to the electromotive force it develops. In any motor there are two distinct organizations of parts, the field and the armature. The field is generally established by current from the source supplying the motor. The current is allowed to pass

through the armature, which sets up a rotation due to the force exerted by the action of the field on the armature. The motion of the armature conductors through the field produces in them an electro-motive force precisely as though they were driven by mechanical means instead of by electro-magnetic. The electro-motive force is negative with respect to the current in the armature, and is therefore called counter-electro-motive force. The product of the counter-electro-motive force into the current in the armature is the number of watts transformed into mechanical power.



Simple Form of Electric Motor.

Since there are two great methods for distributing electrical energy, one by constant difference of potential and variable current and the other by constant current and variable difference of potential, there are likewise two classes of motors for transforming these two great forms of electrical energy into mechanical energy. In direct-current working series motors are used exclusively on constant-current circuits, and on constant-pressure circuits both shunt and series motors are used; where constant speed is desired, as is generally the case in stationary work, the shunt motor is employed, and for speeds varying through wide ranges the series motor has been found to give the best results. Any alternate-current dynamo will operate as a motor from an alternate-current circuit of the same periodicity. The alternator to be operated as a dynamo must first have its field excited by means of a direct current, and the speed of the armature brought up to its normal value, so that it will produce an electro-motive force almost equal and opposite to that of the supply mains; if its periodicity also is the same, the machine may be connected to the circuit and will operate as a motor. Alternators thus operated are called synchronous motors.

Electric Rail'ways, those railways on which electricity is the motive power. Out of innumerable trials, attempts, and experiments there was developed the system of electric street-railway propulsion that is now being used in most of the cities in the U. S., and in Europe. In 1887 Frank J. Sprague undertook to equip the Union Passenger Railway, of Richmond, Va., operating twenty cars, for electric traction. The work was completed and the road went into operation with electric motive power early in 1888. This being the first road to be so equipped with a determined view to permanent operation, the results of all previous attempts and experiments were carefully looked into, and the methods that were found to be best and most practicable were adopted. The outcome was the adoption of the single overhead trolley system, using the earth and the rails as a return.

In modern practice the current is supplied at a constant potential of 500 volts from the dynamos in the generating station to the car motors direct by means of a bare copper wire, called the trolley wire, suspended in the air over the center of each car track. Fig. 1 gives a good idea of the way the trolley wire is suspended in the streets and the method adopted for taking the current from it to the motors on the car trucks, from which it is returned to the power house through the wheels, track, and earth. The trolley wire is suspended by means of cross wires attached to poles erected at the curbs in the streets. These cross wires are insulated from the trolley wire except where it is electrically joined to the feed wires. The feed wires provide all extra conducting capacity needed for keeping up the full supply of current in all parts of the trolley line. They are either given weatherproof

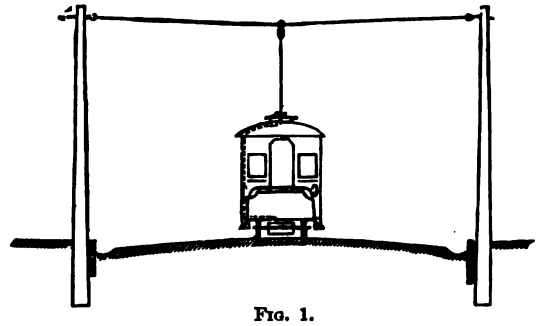


Fig. 1.

insulation and mounted on glass insulators carried on the poles, or they are given a superior insulation, covered with lead, and placed in conduits underground; to these the trolley line is joined electrically at intervals.

The current is taken from the trolley line to the moving car through the trolley and trolley pole that are carried by the car. The trolley and pole being metallic, the current is led through them to the top of the car, and thence through metallic conductors to the motors below. On account of its weight, the motor receives flexible suspension on the car trucks, to lessen the wear on the tracks and protect

the insulation on the fields and armatures of the motors from the excessive shocks that would otherwise be given. This is accomplished by pivoting one end of the motor to the car axle, and suspending the other with springs from the truck frame. The power of the motor is transmitted from the armature to the axle by means of spur gearing, usually boxed in and

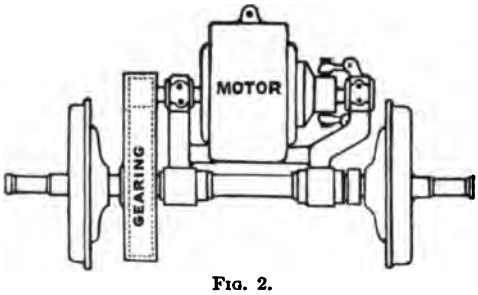


FIG. 2.

flooded with solid oil. The speed of the motors is regulated by changing the electrical pressure applied at the brushes of the armature, and by varying the magnetization through the armature. The change of electrical pressure through the armature is accomplished by means of a variable resistance, in series with the motor, while the magnetization through the armature is varied by cutting in or out of circuit some turns in the field winding. The method of mounting and connecting the motor is shown in Fig. 2. See RAILWAYS OR RAILROADS.

Electric Tel'egraph. See TELEGRAPH.

Electric Weld'ing, process of welding metals in which advantage is taken of the heat generated by the electric current. Either continuous or alternating currents may be used, but the latter method is preferred. A dynamo of the customary form is used in a circuit with a "step down" transformer, which reduces the voltage to very small values with corresponding increase of the current. When two pieces of metal are to be joined they are firmly clamped within the jaws of the welding machine. The pieces are then brought into imperfect contact and current begins to flow, developing heat in the only portion of the circuit which offers high resistance, *i.e.*, at the junction of the metals.

Electro-ballis'tics, electrical branch of the science which treats of the motion of bodies projected into space. As generally used, the scope of the term "ballistics" is restricted to the motion of projectiles of regular form fired from cannon or small arms. To the military student three distinct branches of the subject are presented: (1) Interior ballistics, which treats of the motion of the projectile within the bore of the gun; (2) exterior ballistics, which considers all the circumstances of the motion from the time the projectile leaves the muzzle of the gun until it strikes the target; (3) ballistics of penetration, treating of the effects of the projectile upon the object struck. The first essential in the study of ballistics is some means of measuring accurately a very small fraction of a second of time. All instruments now in use for this purpose are controlled and operated by electricity, and the term "electro-ballistics" is generally employed to designate all the various means, methods, and instruments for measuring ballistic times or velocities. See BALLISTICS.

The more important instruments may be grouped under three heads: (1) Gun pendulums; (2) ballistic pendulums; (3) electro-ballistic chronographs or chronoscopes. In instruments of the first class the velocity of the projectile is determined by suspending the gun itself as a pendulum and measuring the recoil imparted to it by the discharge. The mathematical expression for the velocity is deduced by considering the energy of recoil of the gun to be equal to that imparted to the projectile, the powder charge, and the air. Instruments of the second class consists of a pendulum of sufficient size, thickness, and weight to receive the impact of the projectile without complete penetration, and the expression for the velocity is deduced from the fact that the energy of the projectile at the moment of impact is approximately equal to that of the pendulum and the projectile after impact, as shown by the amplitude of the vibration. Instruments of the third class are generally called chronographs, or chronoscopes, sometimes velocimeters. They vary much in the principles of construction and operation.

For ascertaining the velocity of a projectile, two wooden target frames are set up a short distance apart in front of the gun. Across the face of each frame is stretched, back and forth in parallel strands, a continuous bare copper wire, carrying electric current to an electro-magnet that actuates a recording instrument. The strands are so close together that the projectile cannot pass through the frame without breaking the wire at some point, thus interrupting the electric current. The projectile in passing through the first target breaks the circuit through the starting magnet and operates the chronograph; when it reaches the second target the circuit through the registering magnet is broken, and the exact time interval between the two events is recorded. The velocity of the projectile is found by measuring the time taken to pass over the distance between the two targets.

Electrocu'tion, coined word applied to the infliction of capital punishment by the shock of an electric current, as provided by the legislatures of New York, 1888, and New Jersey, 1907, instead of by hanging.

The apparatus used in the first execution in New York consisted of a stationary engine, an alternating-current dynamo and exciter, a voltmeter with extra resistance coil, calibrated for a range of from 30 to 2,000 volts, an ammeter for alternating currents from 0.10 to 3 amperes, a Wheatstone-bridge rheostat, bell signals, and necessary switches, a "death chair" with adjustable head rest, binding straps, and two adjustable electrodes. The chair, a square-framed oaken one, with a high slightly sloping back and broad arms, was fastened to the floor, its feet being insulated. Attached to the back of the chair above the head rest was a

sliding arrangement shaped like a figure 4, its horizontal arm projecting forward, and holding the head electrode suspended so as to rest on the top of the head; against which it was firmly held by a spiral spring. The spinal or body electrode was attached to the lower part of the back of the chair, and projected forward horizontally on a level with the sacrum.

The electrodes each consisted of a bell-shaped rubber cup, about 4 in. in diameter, with a wooden handle, through the long axis of which the wire passed into the bell terminating in a metallic disk about 3 in. in diameter, and faced with a layer of sponge. The head was firmly secured by broad leather bands, encircling the forehead and chin, concealing the eyes and upper part of face, and fastened to the back of the head rest, while the chest, arms, and legs were secured by broad straps attached to corresponding parts of the chair. The wire attached to the head electrode descended from the ceiling, and that of the lower one passed along the floor to the chair, being protected by a strip of wood. The dynamo and engine were located in one of the prison shops, several hundred feet from the execution room; the voltmeter, ammeter, switchboard, etc., were located in a room adjoining the execution room. The moment the contact was made, the body was thrown into a state of extreme muscular rigidity, and at the end of seventeen seconds the prisoner was pronounced dead, and the contact immediately broken. See CAPITAL PUNISHMENT.

Elec'trodes, surfaces by which electricity passes into and out of different media; especially the poles of the voltaic battery or pile. The so-called positive electrode is the anode, and the negative the kathode.

Electro-dynam'ic En'gine. See DYNAMO-ELECTRIC MACHINE.

Electro-dynamics, the science which treats of the phenomena of electric currents. See ELECTRICITY.

Electrol'ysis, decomposition of chemical compounds by the action of the voltaic current. When the electric current flows through any liquid not a chemical element, decomposition of the latter occurs, and the acid radical is separated from the metallic element with which it had been in combination. Faraday formulated the laws of electrolytic action in terms which have needed no modification. He originated many names still in use in the literature of the subject. Of these the most important are: anode, the electrode through which the current enters the cell; kathode, the electrode through which the current leaves the cell; ion, an element resulting from electrolysis; anion, the ion deposited on the anode; kathion, the ion deposited on the kathode. Faraday's laws of electrolysis were stated by him as follows: (1) The amount of chemical action per second is directly proportional to the current strength. (2) If the same or equal currents pass through several electrolytic cells the weight quantity of the ions set free at the several electrodes will be proportional to the chemical equivalents of the ions, *i.e.*, in the ratio of the atomic or combining weights of their respective atoms or group of atoms. The amount of an ion deposited by the unit current in a unit of time is termed the electro-chemical equivalent. The amount of electrolysis due to the passage of a coulomb of electricity is thus a definite quantity.

Electro-magnet'ic Induc'tion. See INDUCTION.

Electro-mag'netism. See ELECTRICITY.

Electro-met'allurgy. See ELECTROTYPE.

Electrom'eter, instrument for the measurement of differences of potential by means of electrostatic forces. Electrometers may be divided into three classes: (1) modifications of the electroscope, (2) absolute electrometers, (3) quadrant electrometers. To the first class belongs Henley's electrometer, which is simply a pith-ball electroscope, provided with a vertical scale for reading the deflection of the ball. Peltier's electrometer and the Coulomb balance may also be regarded as developments of certain forms of electroscope. In Peltier's instrument the deflection of a pivoted rod was read on a circular scale; in the Coulomb balance the electrical forces were measured by means of the torsion of the suspension fiber.

These instruments have been superseded by the more accurate and convenient quadrant electrometer, the essential parts of which are the needle, simply a strip of metal, and the quadrants. The former is very light and thin, mounted in a flat cylindrical box, or sometimes above a divided disk. The box is cut into quadrants separated from one another by an air space sufficient to give complete insulation. Each quadrant is mounted on a glass post. The needle, swinging in the center of the box, touches none of the quadrants. The suspension is usually bifilar (on two threads), although in some forms of the instrument the torsion of a single suspension fiber is substituted. The quadrants are connected pairwise by wires diagonally across, one with three and two with four.

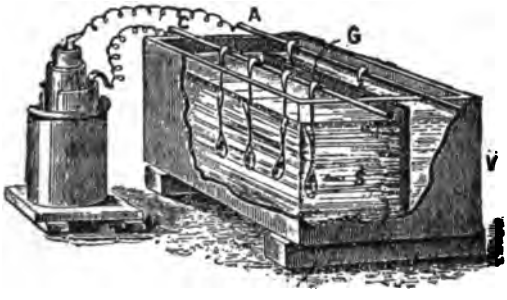
To hold the needle at the high potential necessary for great sensitiveness Lord Kelvin (in the Thomson electrometers) mounted the needle and quadrants upon a Leyden jar, the inner coating of which consisted of strong sulphuric acid. The needle was connected with the inner coating by means of a fine platinum wire which dipped into the acid, and thus always shared the electrification of the jar. Valuable modifications of the Thomson electrometer have been made by Kirchhoff, Mascart, Carpentier, Ryan, and others; and an entirely different principle has been introduced by Lippmann in his "capillary electrometer." In this instrument advantage is taken of the movement of a mercury column in a small tube (owing to changes of the surface tension when electrified), and it is found possible to measure very minute differences of potential (.0001 volt).

Electro-mo'tive Force. See FORCE and ELECTRIC MOTOR.

Elec'tron, subdivision of an atom, and, according to a recent hypothesis one of the ulti-

mate particles of which matter is composed. According to J. J. Thomson, a prominent advocate of the electron theory, these particles are the primordial particles out of which all the atoms known to chemistry are constructed, the chief difference between the chemical atoms being due to the number of electrons which enter into each. Each electron is endowed with a permanent electric charge, and Thomson advances the hypothesis that perhaps the positive charges constitute the nucleus of the atom about which as a center the negative electrons are rapidly rotating. One of the most important conclusions drawn from this hypothesis is that the vibrations of electrons give rise to light and heat waves.

Elec'troplating, covering of the surface of articles formed of the cheaper metals with gold, silver, platinum, nickel, copper, or other costly metals by means of the electric current. All articles to be plated are most carefully cleaned and scoured. They are then dipped in a solution of nitrate of mercury, and receive



AN ELECTRO-PLATING BATH.

The electrodes are hung from metal rods, the anode A being a plate, G of the metal to be deposited, and the cathode C the material upon which it is to be deposited. V, a vat, and S, the solution.

therefrom a thin film of mercury, which causes the plating to adhere firmly. The bath of silver, gold, or platinum contains 100 parts of water, 10 of potassium cyanide, and 1 of the cyanide of the precious metal to be employed. The articles to be plated are suspended in this bath, and treated as described under ELECTROTYPE (*q.v.*). After removal, they are brushed and burnished. This process is of great importance in the arts, one of its applications being the operation of nickel plating.

Electroph'orus. See ELECTRICAL MACHINE.

Elec'troscope, instrument for indicating electrification. It usually consists of a pair of gold leaves attached to the lower end of a vertical metallic rod, mounted within a metal box with glass windows. The rod, which terminates without in a ball or a disk, is insulated from the case by means of a layer of shellac or glass. When a charged body is brought near to the disk or knob, the latter, together with the gold leaves, is acted upon inductively, and the leaves diverge, indicating electrification, but not showing the character of the charge. If the leaves be given a permanent charge, the instrument will indicate also the sign and the relative degree of excitation. This form of electroscope was first described by Bennet (1787).

Elec'trotype, cast of an object procured by the gradual deposition of a metal from a solution by electricity. When two pieces of platinum are put into a solution of sulphate of copper, and if an electric current is transmitted through the solution by means of these platinum plates, copper is at once deposited on the kathode plate, the anode remaining clean. By continuing the electric currents, and keeping up the strength of the solution by adding fresh portions of the salt of copper, the metallic film on the kathode may be made of any required thickness, and afterwards peeled off the platinum surface. The texture of the copper deposited varies with the battery power employed and with the strength and temperature of the solution, and may be hard, brittle, and crystalline, or tough and malleable, according to the management of the operator. When the kathode is irregular (like a coin or medal), instead of being a plane surface of platinum, an exact impression of the device may be taken off on the precipitated copper. With proper management, gold and other metals may be substituted for copper, and if the metal be left on the surface on which it is thrown down, gilding, silvering, etc., may be done extensively and with fine effect. This art is called electroplating. See PRINTING; STEREOTYPING.

Elec'trum, natural alloy of gold and silver, in the proportion of two of gold and one of silver; is found in Siberia, Norway, and California, and occurs in tabular crystals or imperfect cubes of a silver-white color.

Elegiac Distich (ē-lē'jī-ăk dĭs'tĭk), a couplet consisting of a dactylic hexameter and a pentameter. The second verse repeats the movement of the hexameter, as if reconsidering it. Hence its reflective, emotional character. Schiller's famous distich is translated by Coleridge thus:

In the hexameter rises the fountain's silvery column·
In the pentameter aye falling in melody back.

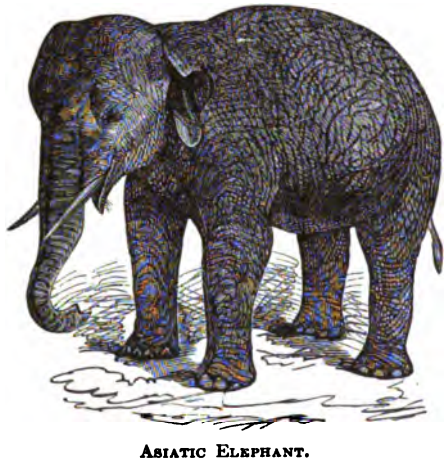
The elegiac distich was the first step toward the strophe, and was used in the elegy (ἐλεγεῖον), the poetry of subjective reflection. As to the inventor, the ancients did not agree. There are extant elegies, or fragments of them, by some fifty poets, from Callinus (730 B.C.) down; but the period specially marked by elegiac composition closes not long after Theognis (540 B.C.), of whom we have about 1,400 verses. This form of poetry was much used in epigrams, epitaphs, etc. The chief Roman elegists are Catullus, Propertius, Tibullus, and Ovid.

El'egy, the name given by the ancient Greeks and Romans to poems of various kinds. In modern times the name is applied chiefly to poetical compositions of a melancholy character, such as Gray's "Elegy Written in a Country Churchyard." Elegy in music is composition expressing feelings of sadness, longing, grief, love, etc.

El'ement, term used in various senses; a first principle; a rudiment; a constituent part of a compound; sometimes the proper state or sphere of a person or an animal. In the plural, the first principles or rules of a science or art; also the bread and wine in the eucharist. Ancient philosophers applied this term to fire, air, earth, and water, each of which, in their several systems, was supposed to be the first principle of all things. As a modern scientific term, "element" signifies a simple substance, or one which chemists have not yet decomposed.

Elements, Chem'ical. See CHEMISTRY.

El'ephant, common name of the members of the subfamily *Elephantinæ*, a group of thick-skinned mammals of the order *Proboscidea*, distinguished among living mammals by the possession of a long trunk, or proboscis, a prolongation of the nose. The head is large and rounded. The legs are straight and mass-



ASIATIC ELEPHANT.

ive; the ears large, flattened, and in repose carried along the side of the neck; the dark, wrinkled skin is nearly naked, being sparsely sprinkled with black hairs, while the end of the tail bears a tuft of coarse whalebone-like hairs. There are but two incisors; these, which are in the upper jaw, grow throughout life as two pointed, slightly curved tusks. The tusks consist of that fine-grained, elastic modification of dentine termed ivory. The most striking feature of the elephant is the trunk. With it he conveys food to his mouth, or drinks by drawing up water in the nostrils and discharging it into his mouth. Tusks have been obtained 9 to 10 ft. in length, and 150 lbs. in weight, but such are rare. Elephants usually associate in small herds, although formerly the African species was found in large herds. The female brings forth but one young at a birth, the baby elephant being about 3 ft. high, and from 150 to 200 lbs. in weight. The rate of growth is slow, an elephant requiring from twenty to thirty years to attain its full stature and full weight, this latter varying from 6,000 to 9,000 lbs. Its food is strictly vegetable, consisting of the twigs and leaves of trees, shoots of young bamboo, grass, and aquatic plants. There are but two species of existing elephants, the Asiatic and the African, these being the sole survivors of a race that once ranged over the greater portion of the earth. In the days of Hannibal, the Carthaginians employed elephants in their wars with Rome. Elephants formerly played a prominent part in the wars and state ceremonials of East Indian potentates, and are to-day used by them in hunting tigers and other game, and to swell the pomp and circumstance of their state. They are used in the British Indian forestry department, and in the East Indian army for the transportation of artillery and military stores.

Elephan'ta, island in the harbor of Bombay, India, 7 m. from that city; contains remarkable ancient cave temples excavated out of the native rock, and adorned with sculptured figures of the Hindoo mythology.

Elephanti'asis, disease rare in Europe and N. America, though not unknown in either; is endemic in the Levant and the E. and W. Indies, whence it is often called "Barbados leg." The foot and leg, or sometimes other parts, becomes greatly enlarged and hardened, the skin assuming a remarkable roughness and usually a darkness of hue. It is sometimes caused by a small animal organism, the *Filaria sanguinis hominis*, which infects the lymphatic glands and obstructs the flow of lymph.

Elephan'tiné, island in the Nile River; opposite Assouan. Among its ancient monuments is the Nilometer mentioned by Strabo, and designed to record the height of the inundations of the Nile.

El'ephant Seal, or **Sea Elephant,** the two largest members of the hair-seal family, so called from their great size, and from the fact that the adult males have a short proboscis. The male S. elephant seal is, when full grown, 20 ft. from tip of nose to end of outstretched hind flippers. This seal is most abundant at Kerguelen, Heard, and Macquarie islands in the S. seas, where they have long been hunted for their oil. The N. elephant seal, which very closely resembles that of the S., was once abundant on the coast of Lower California.

Elephant's Foot, plant sometimes called Hottentots' bread; belongs to the yam family, having a large, fleshy root stock, which is eaten by the Hottentots.

Eleusinia (ē-lū-sĭn'ē-ă), or **Eleusin'ian Mys'teries,** annual festival celebrated in ancient Greece in honor of Demeter (Ceres) and Persephone (Proserpine). The worship of Demeter originally took place at Eleusis only, but after the conquest of that city by the Athenians, feasts were celebrated in her honor in various Grecian cities. The festival consisted of the greater and the lesser mysteries. The lesser feast was held in the spring at Agræ, on the Ilissus, and was only a preparation for the real or greater mysteries. The latter took place in October, and occupied nine days, partly at Athens, partly at Eleusis. Besides these ceremonies there were others, of which

the Eleusinian games, supposed to have been the most ancient in Greece, were the chief. The Emperor Theodosius suppressed the festival.

Eleusis (ĕ-lū'sĭs), ancient city of Greece; in Attica, near the N. shore of the Gulf of Salamis; 12 m. NW. of Athens; the chief seat of the worship of Demeter (Ceres), whose mystic rites, called *Eleusinia*, were here performed annually.

Eleuthera (ė-lū'thė-rä), one of the Bahama Islands.

Eleuthe'ria, national festival of the Greeks, instituted 479 B.C., to commemorate their deliverance from the invading Persian armies; celebrated annually at Platæa.

El'evated Rail'way. See RAILWAY.

Eleva'tion, the act of raising to a higher level or place; the act of exalting in rank; altitude; height above the surface; sometimes exaltation of mind or style; a hill or elevated ground. In engineering and architecture, a geometrical representation of a building or other object, as if projected upon a vertical plane by perpendicular lines drawn through its defining lines or points. It is generally a projection of the exterior, therein differing from a section which shows the interior, or a part, as if cut through.

ELEVATION in astronomy is the angular height or the altitude of a celestial object above the horizon, measured by the arc of a vertical circle passing through it and the zenith. Thus the elevation of the pole denotes the arc of the meridian intercepted between the pole and the horizon, and is always equal to the latitude of the observer. The greatest elevation of a star occurs when that star is on the meridian.

ELEVATION in gunnery is the inclination of the axis of the cannon or gun above the object aimed at, in order to counteract the effect which the force of gravity causes. It varies with the range.

ELEVATION of the Host, in Roman Catholic ritual of the mass, the lifting up of the elements (bread and wine) after consecration for the adoration of the people; forms one of the most solemn and impressive features of the Roman Catholic liturgy.

El'evators, or Lifts, machines for lifting passengers or freight, consisting essentially of a car raised by ropes or pushed up by a ram from below, power being applied to the ropes or ram, and the car maintained in lateral position by rails of wood or metal, on which it moves. The term is applied to machines of which the vehicles move in a vertical direction. Elevators of crude form have been used since the earliest times, being propelled by man, animal, and water power; the improved forms date from abt. 1850. Elevators are classified as hand, power or belt, steam, hydraulic, and electric. Hand elevators are worked by hand power. In power elevators the ropes supporting the car are wound on drums, revolved by gearing and pulleys driven by belts. In steam elevators the ropes are wound on drums revolved by steam engines, the engine forming part of the machine; these are used principally in mines, blast furnaces, and warehouses. Hydraulic elevators are of two principal forms, the ram type much used in Europe, and the suspended type. Electric elevators are essentially the same in construction as steam elevators, electric motors being substituted for the engines. Among the most notable elevators are the steam elevator in the Washington Monument, Washington, D. C., which has a travel of 500 ft., and the hydraulic elevators in the Eiffel Tower, having a travel of 420 ft., and lifting fifty persons at a speed of 400 ft. per minute.

Elf, imaginary being who figured prominently in the mythology of NW. Europe, Germany in particular; as good or bad elves their exploits gave rise to many marvelous tales. Fairies take the place of elves in Celtic legends, and are in general represented as beneficent. See BROWNIE; FAIRY.

El'gin, James Bruce (eighth Earl of), British statesman; b. London; succeeded, 1841, to the earldom which was a Scottish peerage; was Governor General of Jamaica, 1842–46; of Canada, 1846–54; Postmaster-General, 1859–61; Governor General of India, 1861–63; negotiated important treaties with China and Japan.

Elgin, royal burgh of Scotland; capital of County Moray or Elgin; on the Lossie, 118 m. N. of Edinburgh; has an institution for the education of orphans, and the ruins of a cathedral founded in 1224, the most extensive and beautiful of ancient Scottish remains; also the ruins of a castle of the Earls of Moray. Pop. (1901) 8,260.

Elgin, a city in Kane Co., Ill.; on both sides of the Fox River; 36 m. W. of Chicago; noted for extensive manufactures of watches and condensed milk; other products: butter, cheese, bicycles, sewing machines, boilers, and silver-plated goods; contains Illinois N. Hospital for the Insane, Elgin and St. Mary's academies, Gail Borden Free Library, and several bridges across the river. Pop. (1900) 22,433.

Elgin Mar'bles, collection of Greek sculptures, chiefly from the Parthenon at Athens, taken to England by Thomas Bruce, Lord Elgin (British Ambassador at Constantinople, 1799–1803), and purchased by the nation for the British Museum.

El'gon, Mt. See VOLCANOES.

E'li, high priest at the temple of Shiloh when the ark of the covenant was in the tabernacle at that place (I Sam. i, 3, 9), and civil judge of Israel. In his old age Israel was defeated in battle by the Philistines; his sons, Hophni and Phinehas, were slain, and the ark of God, which they had taken to the field, was captured (I Sam. iv). A messenger brought the fatal news to the aged high priest, who, on hearing that the ark was taken, fell from his seat and died.

Élie de Beaumont (ā-le' dė bō-mōn'), **Jean Baptiste Armand Louis Léonce**, 1798–1874; French geologist; b. Canon, Calvados; became

Prof. of Geology in the College of France in 1832; Chief Engineer of Mines, 1833. Among his works are "Carte Géologique de la France," and "Notices sur les Systèmes des Montagnes."

Eli'jah, Hebrew prophet. The chief events in his life were his prediction of the great drought which afflicted Israel; the confounding and destruction of the priests of Baal; his persecution by Jezebel; his prediction of the violent deaths of Ahab, Jezebel, and their son Ahaziah; his appointment of Elisha to succeed him in the prophetic office; and his own translation (removal to heaven) in a chariot of fire.

E'lim, second station mentioned in the march of the Israelites after crossing the Red Sea (Ex. xv, 27); has been identified with Ghurundel, about halfway between Suez and Sinai.

El'iot, Charles William, 1834– ; American educator; b. Boston, Mass.; tutor in mathematics at Harvard, 1854–58; assistant Prof. of Mathematics and Chemistry, 1858–61; of Chemistry, 1861–63; Prof. of Chemistry in the Massachusetts Institute of Technology, 1865–69; president of Harvard, 1869–1909; author (with F. H. Storer) of "Manual of Inorganic Chemistry," "Manual of Qualitative Chemical Analysis," "Educational Reform," etc.

Eliot, George (pseudonym of MARY ANN, or MARIAN EVANS CROSS), 1819–80; English novelist; b. Arbury Farm, Warwick; in 1841 was converted to Rationalism; published, at first anonymously (1846), the completion of Mrs. Hennell's translation of Strauss's "Life of Jesus"; editor of the *Westminster Review,* 1851–53; formed in 1854 a union with George Henry Lewes; published "Scenes from Clerical Life," 1858; "Adam Bede," 1857; "The Mill on the Floss," 1860; "Silas Marner," "Romola," 1863; "Felix Holt," 1866; "Middlemarch," 1871–72; "Daniel Deronda," 1878; "The Impressions of Theophrastus Such"; also a drama, "The Spanish Gypsy," 1868; and the poems, "Agatha," "The Legend of Jubal," and "Armgart"; after the death of Mr. Lewes, 1878, married John Walter Cross.

Eliot, John, 1604–90; "the apostle to the Indians"; b. Widford, England; removed to Boston, Mass., 1631, and in 1632 began his connection with the church at Roxbury which he held at his death; he mastered the language of the Indians, and from 1646 devoted himself to improving their condition and converting them to Christianity; acquired great influence over them, and many embraced Christianity. He translated the Bible into the Indian tongue (1661–63), published an Indian grammar (1666), and a number of other works, mostly relating to his missionary labors. Copies of the Eliot Indian Bible are eagerly sought by collectors, and command several thousand dollars apiece.

Eliot, Sir John, 1592–1632; English statesman; b. Port Eliot, Cornwall; entered Parliament, 1624; upheld parliamentary privilege against royal encroachment; pressed the proceedings that ended in the Duke of Buckingham's impeachment, and at his trial denounced him in a masterly speech. As vice admiral of Devon, suppressed piracy; in the Parliament of 1628 was instrumental in carrying through the Petition of Right; was thrown into the Tower, 1629, and there died. He wrote "The Monarchy of Man," "An Apology for Socrates," etc.

E'lis, small state of ancient Greece in the NW. part of the Peloponnesus; bounded N. by Achaia, E. by Arcadia, S. by Messenia, and W. by the Ionian Sea; intersected by the Alpheus (now Rouphia) and Peneus (Gastuni) rivers; chief towns, Elis, Cyllene, Pylos, and Olympia. The Olympic games, the greatest national festival of the Greeks, were celebrated at Olympia. Elis forms with Achaia a nomarchy of the modern Kingdom of Greece. Elis, the capital of the state, is on the river Peneus, about 10 m. from its mouth. The city contained several fine temples, a theater, and the largest gymnasium in Greece. All the athletes who contended at the Olympic games were required to undergo one month's previous training in this gymnasium. The site is occupied by the modern Paléopoli or Kaloscopi.

Eli'sha, Hebrew prophet, called to the prophetic office by Elijah, receiving his mantle when he was taken up into heaven; recognized by the other prophets as their spiritual head.

Elix'ir, old pharmacy term of Arabic origin, being the solution of a medicine in alcohol, and now called a tincture. The elixir vitæ, or elixir of life, which was to confer immortality upon those who drank it, was one of the objects sought by the alchemists, who also sought elixirs to change the baser metals into gold.

Elis'abeth, wife of Zacharias and mother of John the Baptist. An angel foretold to her husband the birth of a son to her old age; and it was also foretold by the angel Gabriel to the Virgin Mary, as an assurance of the birth of the Messiah.

Elizabeth, 1533–1603; Queen of England; b. Greenwich; daughter of Henry VIII and Anne Boleyn; last sovereign of the house of Tudor; was highly educated; ascended the throne, 1558; recognized as the head of the Church, 1559, by Parliament, which abolished the mass and adopted the Thirty-nine Articles as the religion of the state; declined an offer of marriage made by Philip II of Spain; made William Cecil, Lord Burleigh, her Prime Minister and most trusted adviser. To promote the stability of her throne, she aided the Protestant insurgents in Scotland, France, and the Netherlands with money and troops; held Mary Queen of Scots, a prisoner, and signed her death warrant, 1587. She persecuted the Roman Catholics (as in the latter part of her reign she did the Puritans), and for this and for the aid given his revolted Dutch subjects, Philip II sent out, 1588, the "Invincible Armada," part of which was wrecked and the rest defeated by the English fleet under Admiral Howard. Her reign was one of the most prosperous and glorious in English history, and was illustrated by the genius of Shakespeare, Spenser, Bacon, Sidney, and Raleigh.

Elizabeth, Queen of Rouma'nia. See CARMEN SYLVA.

Elizabeth, Saint, 1207–31; daughter of Andrew II, King of Hungary; b. Presburg; became, 1221, the wife of Louis, landgrave of Thuringia, who died, 1227, on a crusade to the Holy Land. His eldest brother Henry seized his possessions, and banished his widow and children. The Knights of Thuringia restored her son Herman to the throne, and Elizabeth received as a dower the city of Marburg, where she retired, and spent the remainder of her life in penance.

Elizabeth, capital of Union Co., N. J.; on Staten Island Sound and on Elizabeth River, 14 m. from New York; has shipyards, oil refineries, foundries, and manufactures of pumps, brick, chemicals, sewing machines, paints, hardware tools, hats, etc. Elizabethport, the part of the city on Staten Island Sound, is a shipping point for anthracite and iron. Elizabethtown, as it was originally called, was settled in 1665, and was the capital of New Jersey until 1790. Pop. (1905) 60,509.

Eliz'abethan Ar'chitecture, term applied to the style which prevailed in England mainly during the reigns of Elizabeth and James I. It resulted from the introduction of *Renaissance* or classic forms from Germany and Holland during the reigns of Henry VIII and Elizbeth; and, while it retained the mullioned and traceried windows and bays, the hood moldings and parapets of the preceding Tudor style, it employed many classic details and a somewhat monotonous style of surface carving derived from Holland and Germany.

Eliz'abeth Is'lands, group of sixteen small islands belonging to Dukes Co., Mass., lying between Vineyard Sound and Buzzard's Bay; constitute since 1864 the township of Gosnold. The islands were once densely populated. Cuttyhunk was the seat of Bartholomew Gosnold's first colony in "Virginia," founded 1602, but abandoned the same year, on account of troubles of the colonists with each other and with the Indians. The islands are a favorite resort for fishing and yachting. One of them, Penikese, was presented in 1873 by John Anderson, of New York, to Prof. Agassiz, for the purpose of establishing a school of natural history upon it. Mr. Anderson also gave $50,000 toward the endowment, which was indirectly connected with the Museum of Comparative Zoölogy at Cambridge, Mass.

Elizabeth Petrov'na, 1709–62; Empress of Russia; daughter of Peter the Great and Catherine I; became empress in 1741. As an ally of Austria and France, she waged war against Frederick the Great in the Seven Years' War; her army gained a victory at Kunersdorf, and entered Berlin, 1760. She had several children by Count Rasumovski, who was first her servant, subsequently her chamberlain, and was at length secretly married to her. She was succeeded by her nephew, Peter III.

Elizabeth Stu'art, 1596–1662; Queen of Bohemia; daughter of James I of England; b. Falkland, Scotland; married, 1613, to Frederick V, elector palatine, who was chosen King of Bohemia, 1619, by the Protestant party. Her husband was defeated in battle, 1620, and she passed the remainder of her life in exile and adversity. She was the mother of thirteen children, including the famous Prince Rupert. George I. of England was her grandson.

Elk, popular name of a species of deer (*Alces machlis*) found in the N. part of Europe, Asia, and N. America; one of the largest animals of the deer family, the *Cervidæ*, is about 6 ft. high, and sometimes weighs 1,200 lbs. The antlers of the full-grown elk are flattened, displaying a broad blade with numerous snags on each horn. The tail is only 4 or 5 in. long.



EUROPEAN ELK.

Elks can run with great speed. They frequent marshy districts and swampy forests, feeding on lichens, leaves, and branches of trees. The true American elk, commonly called the moose, is found from Maine to British Columbia, and in winter is much hunted for its flesh and skin; it is the largest known member of the deer family now existing. The beast generally known in N. America as the elk is the wapiti (*Cervus canadensis*), an animal nearly as large as the moose, once found as far E. as Pennsylvania, but now restricted to the NW. It goes in large herds, and is hunted for its flesh, and especially for its skin. Several other large species of deer (as in Ceylon), or of antelope (as in S. Africa), are known locally as elks. See DEER; MOOSE.

El Khargeh (ĕl kär'gĕ), town of Upper Egypt; capital of the Great Oasis. Here are ruins, chiefly Macedonian and Roman, including a temple, and an ancient necropolis. El Khargeh is also the name of the Great Oasis itself, 80 m. long and 10 m. broad.

Elk'hart, city in Elkhart Co., Ind.; at the confluence of the St. Joseph and Elkhart rivers, 100 m. E. of Chicago; has the repair shops of the Lake Shore & Michigan Southern Railroad, carriage factories, paper mills, starch mills, and manufactures of printing presses, bicycles, brass goods, and musical instruments. Pop. (1907) 17,501.

Elk'horn, river of Nebraska; rises in the NE. part of the state, and enters the Platte in the W. part of Sarpy Co.; length about 250 m.

Elk Lake, small body of water S. of Lake Itasca, Minn., and connected with it by Elk Creek. It is not the ultimate source of the Mississippi, as several creeks tributary to Itasca spring from sources farther removed from that reservoir than is Elk Lake.

Elk Riv'er, in W. Virginia; flows nearly W. through Braxton and Clay Cos., and enters the Great Kanawha at Charleston; length, nearly 150 m.

Ell, measure of length adopted from the length of a man's forearm. The English ell is 3 ft. 9 in., and the Flemish is equal to 27 in., or three quarters of a yard.

Ell'enborough, Edward Law (Lord), 1750–1818; English lawyer; b. Cumberland. In 1785 he was leading counsel for the defense in the trial of Warren Hastings, for whom he contended with success. He began his political career as a Whig, but was driven into the Tory ranks by the fears which the French Revolution excited. He became Attorney-General in 1801; Lord Chief Justice of the King's Bench and Baron Ellenborough in 1802.

Ellenborough, Edward Law (Earl of), 1790–1871; British statesman; son of Baron Ellenborough; succeeded his father as baron in 1818; was Lord Privy Seal, 1828–29, and gained distinction as an orator in the House of Lords. In 1841 he was appointed Governor General of India, where his brilliant but rash administration provoked severe criticism; was recalled, 1844, and then received the titles of viscount and earl. He was First Lord of the Admiralty for a short time in the cabinet of Peel.

Ell'ery, William, 1727–1820; American statesman; b. Newport, R. I.; in 1770 began to practice law at Newport; chosen a delegate to the national Congress of 1776, in which he signed the Declaration of Independence; reëlected, and remained in Congress until 1785; in that year he actively supported Rufus King in his attempt to abolish slavery.

Ellesmere (ĕlz'mēr) **Land,** portion of Arctic America S. of Grinnell and Arthur lands, and separated on the E. from Greenland by Smith Sound. The region is almost entirely covered with snow and ice.

El'lice Is'lands, group of small islands in the S. Pacific; NW. of Samoa and N. of Fiji; are atolls, or coral islands, and contain lagoons, which in two of the group, Lakena and Olosenga (or Quiros), are of fresh water.

Ell'icott, Charles John, 1819–1905; English theologian; b. Whitwell, near Stamford; 1859, Hulsean lecturer at Cambridge, and, 1860, Hulsean Prof. of Divinity; 1861, Dean of Exeter, and, 1863, Bishop of Gloucester and Bristol. His commentaries on the Epistles of St. Paul put him in the front rank of biblical scholars; his "Historical Lectures on the Life of our Lord Jesus Christ" were the Hulsean lectures for 1859.

El'liott, Ebenezer, 1781–1849; English poet, called the "Corn-law Rhymer"; b. near Rotherham; in early youth worked in a foundry; produced in 1798 "The Vernal Walk," a poem; after he had worked for many years in the foundry, he removed to Sheffield, and engaged in the iron trade on his own account. His most popular poems are "The Corn-law Rhymes," which promoted the repeal of the Corn Laws, and were much admired; he afterwards wrote "The Village Patriarch," "Byron and Napoleon," "Love," and other poems.

Elliott, Jesse Duncan, 1782–1845; U. S. naval officer; b. Maryland; entered the U. S. navy as a midshipman, 1804. In the War of 1812 won the first American naval success on the Lakes by capturing two armed British brigs, the *Detroit* and *Caledonia*, the latter with a cargo valued at $200,000. He commanded the *Niagara* in the battle of Lake Erie, September, 1813, and was second in command to Perry in that engagement. His conduct during the battle was afterwards the subject of insinuations, but a courtmartial pronounced him "a brave and skillful officer." In 1815 he commanded the sloop of war *Ontario* in Decatur's squadron, employed against Algiers. He was promoted captain in 1818. After 1833 he commanded for several years the *Constitution*, but his conduct not being satisfactory to his superiors he was courtmartialed, and was suspended for four years, but was restored to duty, 1843. He was a man of kind feelings, but a rigid disciplinarian.

Ellipse (ĕl-lĭps'), a curve of the second order, one of the conic sections, formed by the intersection of a plane with a cone. If two fixed points be taken in a plane, and a third point be conceived to move around the two fixed points in such a way that the sum of the distances of the moving point from the fixed points shall always be the same, the moving point will describe an ellipse. The fixed points are the foci of the ellipse, and the point halfway between the foci is the center. That axis of the ellipse which passes through the foci is the transverse or major axis; the axis through the center perpendicular to the transverse is the conjugate or minor axis.

If a moving circle roll along the concavity of the circumference of a fixed circle in the same plane, the radius of the former circle being half that of the latter, any given point in the plane of the rolling circle, within or without, will describe an ellipse. Various instruments for marking the ellipse have been devised on this principle. The paths of the planets round the sun are ellipses, the sun being in one of the foci.

Ell'is, Sir Henry, 1777–1869; English antiquary; b. London; Assistant Librarian at the Bodleian in Oxford; received appointment at the British Museum, 1800; chief librarian, 1827; he wrote many works, of which the most important are "Original Letters Illustrative of English History," 1824–46, and "Introduction to Domesday Book," 1833.

Ellis Is'land, small island in New York harbor, about a mile SW. of the city; is owned by the U. S. Govt., and since 1892 has been the point of debarkation for immigrants. Castle Garden was formerly used for this purpose.

Ells'worth, Ephraim Elmer, 1837–61; American military officer; b. Mechanicsville, N. Y.; at the outbreak of the Civil War became colonel of a zouave regiment in the Union army, and in taking possession of the city of Alexandria, opposite Washington, May 24, 1861, was shot dead by an innkeeper from whose roof he had removed a Confederate flag.

Ellsworth, Oliver, 1745–1807; American jurist; b. Windsor, Conn.; became the most eminent lawyer in that state; served in the general assembly at the outbreak of the Revolution; on the committee that managed the military finances of the state, and in the Continental Congress, 1778–83; on the Marine Committee and the Committee of Appeals; was a member of the state council, 1780–84 and 1802–7; Judge of the Superior Court of Connecticut, 1784–87. In 1787 he served in the convention which framed the Federal Constitution; U. S. Senator, 1789–96; led the Federal Party; aided in organizing the U. S. judiciary, and influenced the negotiating of Jay's treaty; Chief Justice of U. S. Supreme Court, 1796–99; one of three commissioners to France, 1800, and chief negotiator of the treaty with that country; Chief Justice Supreme Court of Connecticut, 1807.

Elm, any tree of the genus *Ulmus* of the family *Ulmaceæ*, natives of Europe and N. America, with alternate serrate leaves, which are oblique or unequally heart-shaped at the base. The fruit is a one-celled membranaceous samara, winged all round. This genus comprises numerous species, five or more of which are indigenous in the U. S. The most remarkable is the white or American elm, a large ornamental tree, usually with spreading branches and drooping, pendulous boughs. It grows rapidly, often attains the height of 100 ft., and is admired as one of the most noble and beautiful of forest trees. Its favorite habitat is in moist woods and in the vicinity of rivers and creeks. The trunk sometimes ascends without branches 50 or 60 ft., and then separates into a few primary limbs which gradually diverge and present long arched, pendulous branches. The wood of this tree is used for making hubs of wheels. Another species native in the U. S. is the slippery elm, a smaller tree with a very mucilaginous inner bark, used as a demulcent. The common English elm which grows in many parts of Europe, and is extensively planted in Great Britain, is one of the chief ornaments of English scenery. The wood of this tree, which is compact, fine-grained, and very durable in water, is used for various purposes by wheelwrights, machinists, joiners, and ship builders. It also has a mucilaginous bark, which is esteemed as a medicine. The Scottish wych-elm, a tree of rapid growth, is valuable for timber, which is used for the same purposes as the English elm. Europe also produces the cork-barked elm, a tall tree, named with reference to the corky ridges or wings on its branches. A valuable fine-



American Elm.

grained wood is obtained from the winged elm or wahoo, which grows wild in the S. U. S.

El Mahdi (ĕl mä'dē). See Mahdi, El.

Elmi'ra, capital of Chemung Co., N. Y.; on the Chemung River; 46 m. SW. of Ithaca; is noted for its manufactures, which include window glass, iron bridges, boilers, engines, fire steamers and trucks, woolen, silk, and cotton fabrics, shoes, and wooden products. The city also contains large railway shops, and is a coal-distributing center. The charitable and reformatory institutions are the Arnot-Ogden Hospital, Home for the Aged, Orphans' Home, the Anchorage (a refuge for females), and the State Reformatory, a model reform prison for young criminals. It also has Elmira College, Elmira Industrial School, Steele Memorial Library, and several public parks. During the Civil War the city was a military rendezvous and the site of a prison in which many Confederates were confined. Pop. (1905) 34,687.

El Obeid (ĕl ŏb-ād'). See Obeid.

Elo'bey Is'lands, small group of islands in Corsico Bay, on the W. coast of Africa, in latitude 1° N., belonging, with the neighboring mainland, to Spain.

Elonga'tion, in astronomy, the apparent angular distance of a planet from the sun. The greatest elongation of Mercury amounts to about 28° 30′, that of Venus to about 47° 48′, and that of the superior planets may have any value up to 180°.

Elo'ra, or **Ello'ra,** decayed town of Hindustan, near Dowlatabad. Here are numerous remarkable cave temples, which surpass in magnitude all others in India, and are adorned with statues and other sculptures, also vast edifices or pagodas carved out of solid granite hills, so as to form magnificent monoliths, having an exterior as well as interior architecture, richly decorated.

El Pa'so, capital of El Paso Co., Tex.; on the Rio Grande. Near it the river passes through a mountain gap called El Paso del Norte (North Pass), which is the chief thoroughfare between Mexico and New Mexico. On the opposite bank of the Rio Grande, in Chihuahua, Mexico, is Ciudad Juarez, formerly called Paso del Norte, a village important as the starting point of the Mexican Central Railroad, and having a customhouse, through which goods pass in transit between the U. S. and Mexico. El Paso has a school of mines, iron foundries, smelters (including a copper plant), a refrigerator for meats, ice factories, planing mills, etc. Pop. (1906) 19,248.

El'phinstone, Mountstuart, 1779–1859; British statesman and historian; b. Scotland; son of Lord Elphinstone; entered the Bengal civil service, 1795, was ambassador to the court of Kabul, 1808; Governor of Bombay, 1819–27. He published an "Account of Cabul" and a "History of India: the Hindoo and Mohammedan Periods."

Elphinstone, William, 1431–1504; Scottish prelate and statesman; b. Glasgow; officiated as priest of the Church of St. Michael; was Prof. in the Univ. of Paris, 1468–74; rector Univ. of Glasgow; official of Lothian. He became a member of the Privy Council in 1478; chancellor of the kingdom, 1484; Bishop of Aberdeen, 1483; was Lord Privy Seal, 1492–1514; chief founder of Aberdeen Univ.; wrote a history of Scotland and other works.

Elsass (ĕl'sās). See ALSACE.

Elsass-Lothringen (lōt'rĭng-ĕn). See ALSACE-LORRAINE.

Elsinore (ĕl-sĭ-nōr'), old town and seaport of the Island of Seeland, Denmark; on the W. shore of the sound; 24 m. N. by E. of Copenhagen; defended by the castle of Kronborg, which commands the sound at its narrowest part; has a cathedral, customhouse, and royal palace. It has an active trade, and manufactures of arms, brandy, hats, etc. Here was laid the scene of Shakespeare's "Hamlet," and a mile from the city "Hamlet's grave" is shown.

El-Siwah (ĕl-sē'wä), most northerly of the five Egyptian oases; 440 m. WNW. of Thebes; 6 m. long and 3 broad. Dates, pomegranates, and other fruits are largely produced. Sheep and cattle are bred in great numbers. The oasis is in part rather marshy; chief town, Kebir. The ruins of the Temple of Ammon and of other ancient buildings are still in existence.

Elssler (ĕlss'lĕr), **Fanny,** 1810–84; Austrian dancer; b. Vienna; performed with success in Berlin, Paris, and London; with her sister Therese, also a danseuse, visited the U. S., 1841; retired, 1851. Her sister Therese (d. 1878) was united in morganatic marriage with Prince Adalbert of Prussia, and made Freifrau von Barnim by the king in 1851.

Elton', shallow saline lake of Russia; in the basin of the Caspian Govt. of Astrakhan; 150 m. SSE. of Saratof. About 100,000 tons of salt are annually procured from it. In the summer it looks as if it were covered with snow.

Elutria'tion, process of preparing earths and pigments by washing in large quantities of water, so that the heavier particles sink, and the finer particles, remaining longer suspended, are gradually deposited. This operation is used in preparing clay for making porcelain and some ores of iron and other metals for the furnace. The apparatus used is a vat in which grinding wheels revolve, and into which a stream of water flows; but there are various adaptations of the process.

E'ly, city of Cambridgeshire, England; on the Ouse; 16 m. NNE. of Cambridge; is situated in the fen country called the Isle of Ely. A monastery was founded here in 673, but was destroyed by the Danes in 870 and not restored till a century later. Henry I elevated Ely into a bishopric, 1107; and when the monasteries were dissolved, under Henry VIII, the conventual church was transformed into a cathedral. The interior of this cathedral is one of the most beautiful in England. Another fine building is Trinity Church, founded in 1321. Ely contains many interesting monuments. There are manufactures of oil, earthenware, and clay pipes.

Elysée (ā-lē-zā'), **The Pal'ace of the,** celebrated residence in Paris; at the junction of the Rue du Faubourg St.-Honoré and the Avenue de Marigny; was built in 1718 for the Comte d'Evreux, and served successively as a residence for Madame de Pompadour, for her brother, the Marquis de Marigny, for extraordinary ambassadors, for the financier Beaujon, and for the Duchesse de Bourbon. After the restoration it took the name of Hôtel de la Présidence. It is now devoted to the use of the president of the republic.

Elysium (ē-lĭzh'ŭm), or **The Ely'sian Fields,** classic mythology, the place to which the souls of the virtuous were to be transported after death. Elysium was variously represented as a part of Hades, as an island in the W. Ocean, or as located in mid air. Some of the ancients imagined that the kingdom of Pluto was divided into two regions, Tartarus, in which the wicked were punished, and Elysium, the abode of the good. See HADES.

Elzevir (ĕl'zė-vĭr), or **El'zevier,** a family of Dutch printers who lived at Amsterdam, Leyden, and other places, and were celebrated for the accuracy and beauty of their typography. They published excellent editions of many classic authors between 1583 and 1681.

Emancipa'tion, act of freeing from subjection. In Roman law, a son was regarded as the slave of his father, and could by a fiction of that law be freed by being sold (*mancipatus*) three times by the father. This enfranchisement was termed emancipation. Different modes of emancipation were afterwards recognized by Roman law. In countries where that law prevails the word signifies the exemption of the son from the power of the father, either by express act or implication of law. By the civil

law of France, majority and emancipation are attained at twenty-one, and a minor is emancipated by marriage.

The word emancipation is used in a general sense to signify the liberation of a slave, or the admission of certain classes to the enjoyment of civil rights. Among the most important American state papers is the document issued by Pres. Lincoln, September 22, 1862, as a notice to the Confederates to return to their allegiance, emancipation of the slaves being proclaimed as a result which would follow their failure so to return. The real Proclamation of Emancipation was the document of January 1, 1863, which declared the former slaves then and thenceforward free. This act was simply a war measure, based solely on the President's authority as commander in chief.

Eman'uel (surnamed THE GREAT), 1469–1521; King of Portugal; succeeded John II, 1495, and married Isabella, daughter of Ferdinand and Isabella of Castile; she died in 1498, and Emanuel married her sister Maria; his third wife, married in 1519, was Eleonore, a sister of the Emperor Charles V. Emanuel promoted education, maritime enterprise, and commerce. Portugal was probably the greatest naval power of the world in his reign, which constitutes the golden age of Portuguese history.

Em'ba, or **Jem'ba,** river of Asia, in Turkistan or the Kirghiz territory; flows SW., and enters the Caspian Sea; length about 250 m.

Embalm'ing, in general, the special preparation of a dead organism (human body, animal, or plant) to prevent ordinary decomposition or decay. The term in itself refers to the means, *i.e.*, balms or balsams, employed by some of the ancients. The means which are available and do not in themselves profoundly alter the tissues are (1) cold; (2) the displacement of the water in the body by some gum or resin; (3) drying; (4) saturation of the tissues by antiseptics. The durability of the dead body will then depend directly upon the time during which the conditions antagonistic to the living ferments can be maintained.

In modern times the desire to preserve the distinguished dead, or those especially beloved, as well as the need of preserving the bodies of animals and of men for scientific purposes, has made constant demand for some means for temporary or permanent preservation. The best preserved specimens are those saturated with and preserved in some antiseptic liquid like alcohol. Such bodies are as permanent as the vessels and the liquids that contain them. There are also great numbers of specimens first saturated with some antiseptic, like alcohol, mercuric chloride, zinc chloride, arsenic, or some of the essential oils, then dried and varnished. For the most permanent and perfect preservation the method of nature in imbedding insects in amber must be imitated. This is done on a great scale in every biological laboratory in the world. The water of the specimen is displaced by alcohol or carbolic acid, etc., and then more or less indirectly by the use of turpentine, oil of cloves, etc.; the object is filled with Canada balsam, shellac, etc., and inclosed in the same. With a large body this would be somewhat expensive and require considerable time, but the time and expense would be far less than that attributed to the best Egyptian embalming (seventy days' time; cost, $1,000 to $1,500), while the results would be far superior. A body prepared in this way would require only mechanical protection to render it indestructible.

Most of the embalming of human bodies at the present day is not for the purpose of rendering them permanent, but to preserve them in their natural color and fullness until the funeral or during the time necessary for transportation in case of death away from home. The permanence depends on the thoroughness with which the body is saturated with the antiseptics, and the permanence of the antiseptics themselves. As ordinarily accomplished the body, except the eyes, retains its natural appearance for weeks or months if sealed in an air-tight coffin. A body thus embalmed, if it were slowly dried, would retain far greater naturalness than most of the Egyptian mummies possess. For temporarily embalming it is necessary to saturate all the tissues of the dead with the antiseptic, a solution is made and injected slowly into the arteries. A vein is opened to allow the blood to escape and to aid in determining when the system is filled. After the arterial injection the thorax is filled through a hollow needle passed through the body wall, and by the same means any gas or liquid in the abdomen or any of its organs is drawn off and the abdominal cavity filled with the antiseptic. For an adult from 2 to 4 qts. of embalming liquid usually suffices. Very soon after the arterial and other injections all odor of decomposition will disappear, for the antiseptics will destroy the putrefactive ferments, and thus cut off the possibility of their further action.

The substances used for temporary embalmment are mercuric chloride, arsenic, and zinc chloride. Sodium chloride or common salt is also an ingredient, and instead of water alone as a solvent, glycerin and alcohol are used; carbolic, salicylic, and benzoic acid and one or more of the essential oils are also frequently present. The solutions usually contain from eight to ten per cent of the antiseptics. See MUMMY.

Embar'go, public prohibition forbidding ships to sail, which may be issued at the outbreak of a war for the purpose of making lawful prize of hostile ships in port; or, when an important expedition is contemplated, to detain all private vessels in order to secure secrecy; or an embargo may be laid on ships belonging to individuals, with a view to their use for public service. The most famous American embargo is that of 1807, intended to countervail Napoleon's Berlin and Milan decrees and the British orders in council. This was repealed, 1809. Embargoes were laid also in 1794, 1812, and 1813.

Embas'sador. See AMBASSADOR; DIPLOMATIC AGENT.

Em'bassy, diplomatic mission; the function of an ambassador. In a limited application, "embassy" signifies a mission of an ambassador; *i.e.*, a diplomatic agent of the highest rank, one who in theory represents the personal head of his government, and so has a fixed precedence at court functions, etc. The term is sometimes applied to a company of persons sent on a mission, including one or more envoys, secretaries, etc., as also to the house or residence of an ambassador.

Em'ber Days, certain days in each of the four seasons set apart by the Church for fasting, prayer, and the conferring of holy orders. They are the Wednesday, Friday, and Saturday immediately following the first Sunday in Lent (winter), the feast of Pentecost (spring), the 14th of September, and the 13th of December.

Embez'zlement, wrongful appropriation of the goods of another by one intrusted therewith; differing from larceny, in which the taking as well as the appropriation is felonious. It was not indictable at common law, but has been made a felony by statute.

Em'blements, in law, a term applied to growing crops produced annually by the labor of the cultivator.

Em'bolism, the presence of any foreign substance (*embolus*), usually a portion of a clot of blood in the circulating blood. Emboli often come from the heart, where blood clots are common. Embolism in the brain is a cause of apoplexy by cutting off a part of the circulation, causing an infarct. An extensive embolism of the lungs may lead to sudden death, while a smaller one will cause abscess or gangrene.

Embos'sing, raising of parts of a surface in relief above the other parts, usually for ornamental purposes. The term is usually limited to the beating up of thin plates or sheets of metal (*repoussé*), or the molding of leather, moistened paper, or the like, and is not used to mean relief cut in marble or stone or cast in plaster. It is also applied to embroidery in which the pattern is raised above the surface of the stuff.

Embra'cery, in law, the offense of endeavoring to corrupt or bribe a jury or to influence a jury by any corrupt motive; punishable by fine and imprisonment.

Embra'sure, opening made in the parapet of a fortified place, or in the breastwork of a battery, through which the guns are pointed. The object is to shield as much as possible the interior of the place, and yet leave space for the free action of the gun.

Embroid'ery, needlework on textile material, leather, or the like, with which are sometimes combined applied pieces of colored material, feathers, jewels, or even pieces of looking-glass. Couching is the laying down of threads, as of gold or silver or floss silk, side by side on the surface to be adorned, and holding them fast there by stitches of finer and stronger thread which may not show at all. The larger and softer thread is not dragged through the material of the ground. *Appliqué* embroidery is done by cutting out pieces of cloth, velvet, etc., sewing these pieces fast to the ground, and working the edges with stitches. Such patches of stuff may be cut to resemble leaves or flowers, and stitches on their face may express veins or shading. Cut-cloth embroidery is a variety of this, or merely another name for it. Chain-stitch embroidery is named from the stitch, in which a loop of thread is left on the surface of the stuff to be adorned, and the needle takes the thread through that loop before making another; this is the most generally used of all kinds of work, and is the essence of the pictorial embroidery of the Middle Ages. Crewel work is done with worsted thread, usually on cotton or linen. For the various thread embroideries, cutwork, etc., see LACE.

Embrun (äN-brŭN'), fortified town of the department of Hautes-Alpes, France; on a rock near the Durance; 19 m. E. by N. of Gap; has a cathedral with a fine Romanesque tower, and barracks, formerly an episcopal palace, with a quaint tower of masonry. The town was sacked by the Vandals, Huns, Saxons, and Moors, captured by the Huguenots, and (1692) devastated by the Duke of Savoy; became a bishopric in the fourth century, and was an archbishopric from the ninth to the end of the eighteenth century.

Embryol'ogy, that branch of biology that deals with the development of organisms from the fertilization of the ovum until independent existence can be maintained either as organisms like the parents or as larval forms unlike the parents. All animals begin life as a single cell or egg, formed by the union of the female generative cell, called ovum, with the male generative cell, called spermatozoön. This cell divides in two, and each of these and the resulting cells divide many times. Continued cell division or cleavage forms a rounded group of cells, called the morula. Further division and separation of the central cells result in a cavity inclosed by a single layer of cells, called the blastula or blastodermic vesicle. The blastula is converted into the gastrula by invagination, a process that may be compared to a cup formed by indenting with the finger the surface of a rubber ball. The indenting finger lies in what corresponds to the cavity of the gastrula, which is called the archenteron, and which becomes the adult alimentary canal. The original blastodermic cavity is obliterated. The gastrula is composed of two layers of cells, the outer called epiblast or ectoderm, and the inner called hypoblast or entoderm, which lines the archenteron. From these primary germinal layers, a third one develops between them, called mesoblast or mesoderm. In the higher form of animals the formation of the gastrula is obscured. Forms of cleavage slightly different from the simple or holoblastic type just described take place in eggs where large amounts of food yolk are present in the original cell. Cells of holoblastic cleavage may be approximately equal in size. In eggs with much yolk, segmentation is not complete, but limited to one side of the large cell. Such

eggs and cleavage are termed meroblastic, and are characteristic of most fishes, of reptiles, birds, and the egg-laying mammals. Nourishment of the embryo may be provided for by an abundance of food yolk eventually contained in the yolk sac, or by layers of nutritive material outside the egg cell proper, as the white of the hen's egg. In order to absorb this as well as for purposes of respiration and elimination of waste a special development of an embryonic organ, known as the allantois, takes place from the hinder part of the intestine. In birds and reptiles it spreads over the inside of the eggshell, the embryo being suspended from it by a stalk. In the higher mammals the allantois forms what is called the placenta through which the embryo receives nourishment from the maternal blood. The stalk of the allantois along with other tissues forms the umbilical cord, through the vessels of which circulation is maintained by the embryonic heart. In reptiles, birds, and mammals, the embryo is surrounded by fluid inclosed in a sac, the amnion, which has been early developed as an outgrowth from the sides of the embryonic area. Plants as well as animals pass through embryonic stages. Cells analogous to the female cells of animals become fertilized by cells analogous to the spermatozoön. Cell division takes place and an independent plant, such as the seed, is eventually formed. The embryology of plants, however, is not usually pursued as a separate science, as in the case of animals. See REPRODUCTION.

Em'bury, Philip, 1729–75; founder of American Methodism; b. Ballygaran, Ireland; member of Wesley's society at Court Mattress, 1758; settled in New York as a carpenter, 1760; began to preach, 1766, first in his own house, then in an old rigging loft; erected a chapel on the site of the present "Old John Street Church," working with his own hands and building its pulpit, 1768; preached here without salary till the arrival of missionaries in 1769; afterwards worked at his trade and preached at Camden, N. Y.

Em'den, seaport of Hanover, Prussia; on the Dollart, near the mouth of the Ems; 70 m. WNW. of Bremen; is intersected by several canals, which are crossed by thirty bridges. It has a handsome townhall, exchange building, customhouse, gymnasium, school of navigation, two museums, and an asylum for deaf and dumb, and manufactures of linen fabrics, hosiery, hats, sailcloth, starch, soap, etc. Pop. (1900) 16,453.

Em'erald, green precious stone, really a variety of beryl, owing its exquisite color to the presence of a small amount of oxide of chromium. The crystals are six-sided prisms usually with flat terminations. The value depends chiefly on the depth of color; a fine gem has been sold for $12,500, coming next in price to the diamond. The largest emeralds are found at Takowaja, in the Urals; one in the cabinet of the Imperial Mining School, St. Petersburg, weighs 6¾ lb. troy. Most of the modern emeralds come from Muzo, Colombia, but they are also found in other parts of S. America, in the Orient, and in the Henbach Valley, near Salzburg. Vegetable Creek, New S. Wales, has yielded beautiful specimens, and in the U. S. handsome crystals of light color up to 8 in. in length, only partly transparent, have been found in Alexander Co., N. C. The Romans polished emeralds on the six faces of the natural prism, without reshaping them; such are known as prime emeralds. Oriental emerald is a green variety of sapphire, or corundum.

Emerald Green. See SCHWEINFURTH GREEN.

Em'erson, Ralph Waldo, 1803–82; American author; b. Boston, Mass.; graduated at Harvard College, 1821, and for five years taught school; 1829 was ordained as colleague of Henry Ware, at the Second Unitarian Church of Boston; in 1832 asked and received a dismission, on account of differences of opinion between himself and its members touching the Lord's Supper. In the winter of 1833–34 he began his career as a lecturer, and delivered numerous lectures, chiefly in Boston, on slavery, woman's rights, and other topics of the day, as well as on biographical, literary, and philosophical subjects. In 1835 he settled in Concord, Mass.; was connected with *The Dial*, a quarterly, 1840–44, and for the last two years was its editor; in 1847 he delivered a series of lectures in England. His "Nature," 1836; "American Scholar," 1837; "Address to the Senior Class of the Cambridge Divinity School," 1838, and "Method of Nature," 1841, contain the most prominent peculiarities of his scheme of idealism. His other principal publications were "Essays," 1841 and 1844; a volume of poems, 1846; "Miscellanies," "Representative Men," "English Traits," "The Conduct of Life," "May Day and Other Pieces" (poems), and "Society and Solitude."

Em'ery, one of the hardest minerals known, ranking next to the diamond in its power of cutting or abrading hard substances. It is a variety of corundum or sapphire, of a dark reddish-brown, black, or gray color, and consists almost wholly of the oxides of aluminium and iron; is found in large masses, resembling fine-grained iron ore, for which it has often been mistaken. Its chief sources are in Asia Minor and the island of Naxos in the Grecian Archipelago.

It is used in the arts in a pulverized form, being obtained in grains or in powders of various degrees of fineness by crushing and sifting or by elutriation. The methods of application are various. Lapidaries sprinkle it with water or oil on their lead wheels. Mixed with glue or other adhesive substances, it is spread in a thin layer upon wood, leather, paper, or cloth. It is also molded into solid blocks or wheels, in which form, as solid "emery wheels," the mineral has the widest application and greatest utility.

Emet'ic, medicine capable of causing the stomach to contract and discharge its contents through the esophagus. Emetics are of two classes: (1) those which directly irritate the stomach and produce emesis, and (2) those which act on the nerve centers with like re-

sult. Of the former, mustard and alum are examples; of the latter, ipecac and tartar emetic. Emetics are useful to remove irritating food or poisons from the stomach, or to cause dislodgment of foreign bodies or croupous membrane from the air passages. The mechanical emetics are always safer than those acting on the nervous system.

Emeu (ē'mū). See EMU.

Emigra'tion, act of leaving a country or place where one has resided in order to reside in another. When one leaves a country or place for another he is an emigrant; when he enters another country or place he is an immigrant. Immigration is a sequence of emigration, and as the two conditions of the person are separated only by the time necessary to go from one place to the other, the act of transfer of abode is now generally and officially called immigration (*q.v.*).

Émigré (ā-mē-grā'), French, emigrant, in a special sense, one of those who fled from France during the Revolution. The movement began a few days after the storming of the Bastile, July 14, 1789, when the Prince of Condé and many nobles, alarmed at the course of events, emigrated to the Netherlands and Germany; it was renewed on a larger scale in October, 1789, after the mob had removed the royal family from Versailles to Paris and made them virtual prisoners at the Tuileries; and when the constitution of 1791 was adopted, with its subversion of the ecclesiastical system and destruction of the privileges of the nobility, the number of fugitives increased. The effect of this course upon the Revolution was important; it deprived France of a conservative element when such an element was most needed; it exposed the king's party at home to the suspicion of plotting with their absent friends; and, above all, by the intrigues of the *émigrés* with the powers hostile to the Revolution for the restoration of the old régime the mob was driven to its worst excesses.

Emilia (ā-mēl'ē-ā), ancient name of that part of N. Italy which contains the former duchies of Parma and Modena and the papal delegations of the Romagna. The name was revived in 1859, and applied to a province of modern Italy lying S. of the Po, N. of the Appenines, E. of Piedmont, and comprising the compartments of Bologna, Ferrara, Forli, Modena, Parma, Piacenza, Ravenna, and Reggio Emilia; area, 7,990 sq. m.; pop. (1905) 2,505,034.

Em'inent Domain', right of property possessed by a state, which is higher over all the goods and valuables within the state than that of any individual. The phrase means, in practice, the right inherent in any sovereignty of taking possession of any valuable thing, and using it for a public purpose. In the U. S. it rests on the paramount right of public welfare. Common instances of its exercise are those of lands taken for roads or canals. In all cases compensation is made for property so taken.

Emin' Pasha', 1840–92; assumed name of Eduard Schnitzer, an African explorer; b. Oppeln, Prussian Silesia. He was educated in the universities of Breslau and Berlin. In 1864 went to Turkey and accompanied Hakki Pasha on a series of official journeys through Armenia, Syria, and Arabia. In 1876 he entered the service of the Khedive of Egypt as Dr. Emin Effendi, adopting the name Emin to avoid the Mohammedan prejudice against Europeans. He followed Gen. Gordon to the Sudan, and in 1878 was appointed by him Governor of the Equatorial Province with the title of bey, and the khedive made him pasha in 1887. In the catastrophes that followed the Mahdist rebellion he was left isolated, but still in control of his province. Here he remained until 1889. Stanley's expedition for his relief was organized. Stanley met Emin on the Albert Nyanza on April 29, 1888, and they made their way to Zanzibar, where an accident prevented Emin's return to Europe. On his recovery he entered the German service, and started from Bagamoyo, April 26, 1890, at the head of an expedition 1,000 strong, to govern German territory between Tanganyika and Victoria. After establishing Bukoba on Lake Victoria, he surveyed Lake Albert Edward, and vainly endeavored to penetrate the regions to the NW. of Lake Albert. He set out, on March 9, 1892, without authority from his government, for the Kongo in the company of a band of Arabs, but was murdered by their leader, October 23, 1892, when within a few days' march of the river. Emin's work as a naturalist and linguist placed him in the front rank of African explorers.

Emmaus (ĕm'ā-ŭs), Hebrew, "hot spring," village in Palestine; 7½ m. from Jerusalem; associated with one of the appearances of Christ on the day of his resurrection (Luke xxiv, 13); it was destroyed by an earthquake 131 A.D., and when rebuilt in the third century was called Nicopolis. It is now only a small village, the modern Amwas.

Em'met, Robert, 1778–1803; Irish revolutionist; b. Cork; expelled from Trinity College, Dublin, for republicanism; joined the United Irishmen, whose object was to separate Ireland from Great Britain and make the former an independent republic; implicated in the rebellion of 1798, he escaped to France; returned secretly to Dublin, 1802; organized unsuccessful movement to seize the castle and arsenals; fled, but returned to bid farewell to the daughter of Curran, the lawyer and orator; was captured, convicted of high treason, and executed. He pleaded his own cause with remarkable eloquence. His fate and affection for Miss Curran are the subject of two of Thomas Moore's "Irish Melodies."

Emmet, Thomas Addis, 1764–1827; Irish-American lawyer; b. Cork, Ireland; brother of Robert Emmet; admitted to the Dublin bar, 1791; became a leader of the United Irishmen; was arrested in 1798, imprisoned for nearly three years, exiled, and settled in New York, 1804. He practiced law with distinction; was elected Attorney-General of New York, 1812;

noted as an orator; wrote sketches of Irish history included in McNevin's "Pieces of Irish History."

Emo'tion, state of sensibility which accompanies the exercise of the knowing function of the mind. Special kinds of mental excitement arise in connection with particular mental processes; thus memory yields regret, remorse, pride; imagination throws us into expectation, hope, fear, love. Such states of sensibility we call emotions. The most general predicate which we can make of these states is expressed by the term excitement. "Coolness" or "calmness" denotes the absence of emotional excitement. Particular emotions are correlated to nervous discharges in particular directions often visible as muscular contractions, usually most clearly marked in the face, though the more intense extend to the limbs. See FEELING; SENTIMENT.

Em'mitsburg, village in Frederick Co., Md.; 23 m. N. of Frederick; laid out by William Emmitt abt. 1773; original settlers, Scotch and Irish; Mt. St. Mary's College, one of the most noted Roman Catholic institutions in the U. S., was established near it in 1809 by Rev. John Dubois, Bishop of New York. St. Joseph's Academy, about ½ m. from town, established in 1810 by Mrs. Eliza Ann Seton, of New York, is the mother house of the Sisters of Charity in the U. S., numbers 2,000 members, and has one of the largest educational buildings in Maryland.

Empedocles (ĕm-pĕd'ō-klēz), lived abt. 450 B.C.; Greek philosopher; b. Agrigentum, Sicily; acquired great fame and influence by his attainments in science; his vanity equaled his ability; appeared in public only with great retinue and with crown on head; proclaimed himself divine. He maintained the theory that the world is developed from or compounded of four primary elements, fire, air, earth, and water, and that there are two forces, love and hate (attraction and repulsion). The story that he threw himself into the crater of Mt. Etna to immortalize his name is believed fabulous.

Em'peror (Latin form, IMPERATOR), title bestowed in the Roman republic on commanders of great armies and on consuls elect before entering into office; in later times it designated the highest authority in the state. Cæsar received it on return from his last campaign; Augustus assumed it in preference to *rex* after the battle of Actium, and Rome became an empire; Augustus and his successors took, in addition to *imperator*, the name Cæsar as a title; both words were afterwards adopted as titles by monarchs of other states. These titles disappeared in the West with the fall of Rome (476), but continued in the Byzantine Empire. Charlemagne restored the title in the West, and after centuries of struggles with the popes the German kings gave up their Roman imperial pretensions, and were crowned in Germany as emperors of that country.

The imperial dignity became almost hereditary in the house of Austria, but after Napoleon had assumed the dignity (1804), Francis II, who had proclaimed himself emperor of Austria, renounced the German imperial title (1806), and the old German, or "Holy Roman," empire expired. A new empire of Germany was established under William I of Prussia, 1871, when all the N. and central German states were consolidated into one confederacy.

Russia assumed the title of empire, 1721; France did the same under Napoleon, abandoned it for kingdom, 1814; revived it, 1852, and changed it to republic, 1870. Queen Victoria assumed the title of Empress of India, 1876; the rulers of China, Japan, and Morocco are generally called emperors in English. Brazil changed from empire to republic, 1891; Mexico and Haiti became empires, but failed to maintain that designation.

Emphysema (ĕm-fĭ-sē'mă), an inflation by air or gas in cellular tissue. Emphysema of the lungs is owing to dilatation of the air vesicles.

Emphyteusis (ĕm-fĭ-tū'sĭs), in Roman law, a species of perpetual lease of land for a fixed annual payment. This for a long time was confined to the public lands, but was eventually extended to private lands. The person who received the right of emphyteusis could treat the land almost exactly as if he were owner.

Empiricism (ĕm-pĭr'ĭ-sĭzm). In the time of Celsus and Galen a medical sect called *Empirici* were opposed to the *Dogmatic* sect or school, and considered that medical science should be based on experience rather than on theory. But they extended their idea of theory so far that they excluded anatomy from medical study as a mere theoretical dream, and they narrowed their idea of experience so much that their whole art came to consist in prescribing certain remedies for certain ailments, without regard to the exigencies of the particular case. They became so notorious for ignorance that the term empiric is applied to practitioners who are ignorant of medical science. In philosophy empiric denotes one who depends for truth entirely upon the experience of the senses, independent of those limitations of the mind's constitution which condition and supplement it. (See SENSATIONALISM.) The ancient sophists were empirics, but modern philosophical empiricism began with Locke, and received its greatest logical development from Hume. It is opposed to the "rationalism" of Descartes.

Empale'ment. See IMPALEMENT.

Employ'er's Liabil'ity. See MASTER AND SERVANT.

Emp'son, Sir Richard, d. 1510; English statesman; the extortionate minister of Henry VII and associate of Edmund Dudley in levying the taxes and collecting the fines imposed by the king; was Speaker of the House of Commons, 1491; later held other important offices; was brought to trial soon after the accession of Henry VIII; convicted of treason, and executed with Dudley.

Ems (ĕmz), name of a river of Germany and city of Prussia; the river rises in Prussian Westphalia, near Paderborn; general direction N.; after flowing about 200 m. it enters the Dollart, an inlet of the North Sea, near the town of Emden; connected by a canal with the Lippe. The city, a watering place of Hesse-Nassau, Prussia, is situated on the Lahn River; 7 m. SE. of Coblentz; is one of the most famous resorts of Germany, its waters being used with great effect both for bathing and drinking. On July 13, 1870, the French ambassador, Count Benedetti, had at Ems the famous interview with King William of Prussia which precipitated the outbreak of war between France and Germany.

Em'ser, Hieronymus, 1477–1527; German theologian; b. Ulm; secretary to Duke George of Saxony; was on good terms with Luther and the Wittenberg theologians till the Leipzig disputation (1519), when he sided with Eck against the Reformation.

Emu (ē'mū), large Australian bird allied to the ostrich and cassowary. It differs from the cassowary in being taller, having the bill horizontally depressed, and being without bony crest and pendent wattles. When full grown it is of a brown color, mottled with gray.



EMU.

Emul'sion, medicinal preparation in which oils, such as cod liver or castor, are kept finely divided and mechanically suspended in water by means of such substances as egg albumen or acacia gum. Butter exists in milk as an emulsion, and the term emulsion is also extended to any milky fluid holding minute particles of some substance in suspension.

Enaliosau'rians, group of extinct saurians having, instead of true feet, paddles (for swimming), and having crocodilian teeth and biconcave vertebræ like those of fishes. They appear to have been mostly or all marine. *Ichthyosaurus* is one of the most important of the genera.

Enam'el, vitreous coating applied to a surface of glass or metal and caused to adhere by fusion. It may be opaque, as the white coating of a watch face, or the lining of some cooking vessels, or transparent, as the glaze on fine porcelain. Sometimes the enamel serves as a surface to paint on in vitrifiable colors. For this purpose it is spread on a metal plate, usually copper or gold. The painting may be in one color or more. The most important variety of this painted enamel is Limoges enamel, the best of which belongs to the middle of the sixteenth century, when there were produced splendid plaques, goblets, and tankards, now highly valued. Battersea enamel, produced in England in the eighteenth century, is another variety. Much painted enamel in small pieces for insertion in jewelry was made in France between 1865 and 1885. Much is made in China, with light ground covered with flowers and patterns, and applied to decorative and even to useful vessels. In all these the enamel serves as a background to paint on, exactly as pottery or porcelain would. In other cases the enamel itself, colored in its own substance, forms the pattern.

In *cloisonné* enamel, a metal background has little strips of wire of a square section fastened to it, outlining the pattern; the enamel powder of different colors is put into these compartments, and the heat fuses them all to smoothness. The whole surface is generally, but not always, ground even and polished. This is the kind most commonly used by the Chinese and Japanese for cases, etc. In *champlevé* enamel, a part of the metal surface of an object is engraved rather deeply in a sort of pattern, the hollow being filled with the enamel, which thus shows on a background of the metal. This has always been more common in Europe, and it is much used for jewelry. Enamel *en basse taille* is a variety of this, its peculiarity being that the enamel is transparent and shows a pattern in relief left at the bottom of the hollow in the metal. No decorative art allows of more brilliant color effects than work in enamel.

Encaus'tic Paint'ing. See PAINTING.

Encho'rial Writ'ing. See DEMOTIC WRITING.

Encina (ĕn-thē'nä), **Juan del,** abt. 1469–1534; "Father of the Spanish drama"; b. Encina, near Salamanca; became court poet in the house of the first Duke of Alva. Being represented before a cultivated audience in the house of the duke, and drawing their characters from real life instead of from the liturgy, Encina's plays became the starting point of the secular drama of Spain.

Encke (ĕnk'ĕh), **Johann Franz,** 1791–1865; German astronomer; b. Hamburg; investigated the orbit and movements of the comet which Pons discovered in 1818, and which is now called Encke's comet; became director of the Royal Observatory in Berlin and secretary of the Academy of Sciences, 1825; began to edit the *Astronomische Jahrbücher,* 1830.

Encke's Com'et, comet observed by Pons, November 26, 1818. In 1819 Encke first demonstrated that the same comet had been seen as early as 1786, and several times later. He also found that its period was about twelve hundred days (3.303 yrs.), its successive returns being accelerated and its period shortened by a minute interval of time. It has the shortest period and the least distance from the sun of all the known comets.

Encratites (ĕn'krä-tīts), also called Hydroparastatæ, from their substitution of water for wine in the eucharist; an heretical sect dating from the second century, which inculcated and practiced total abstinence from flesh, wine, and marriage. Later the name was applied to the ascetic Gnostics generally.

En'crinite. See CRINOIDEA.

Encyclope'dia. See CYCLOPEDIA.

Endem'ic, peculiar to some locality; often occurring in a particular region; said of diseases. The investigations of endemic influences deal with climate, topography, geology, water supply, personal habits and character, moral, religious, and political conditions, and with the study of bacteria and other minute organisms. The study of endemic influences has given rise to the new science of medical geography.

En'dicott, John, 1589–1665; Colonial Governor of Massachusetts Bay; b. Dorchester, England; removed to America, 1628; was Deputy Governor of Massachusetts Bay Colony, 1641–44, 1650, and 1654; Governor, 1644, 1649, 1651–54, and 1655–65; led an unsuccessful expedition against the Block Island and Pequot Indians, 1636. He established a mint in spite of a law forbidding such action, and cut out the red cross of St. George from the military standard because, as he claimed, the emblem savored of popery. Under his administration four Quakers, who refused to obey the laws banishing them from the colony under pain of death if they returned, were put to death in Boston.

End'less Screw, a piece of mechanism formed by combining the screw with a cog wheel, or by making a screw act on the threads of a female screw sunk in the edge of a wheel. The axis of the screw may be either in the plane of the wheel or at right angles to it; in the latter case it is called the American endless screw. In its mechanical principle the endless screw is a combination of the inclined plane and the lever.

Endlicher (ĕnt'lĭch-ĕr), **Stephen Ladislaus,** 1804–49; Hungarian botanist; b. Pressburg; became director of the Imperial Library of Vienna, 1828, and Prof. of Botany in the university of that city, 1840; chief works, "Genera Plantarum," "Iconographia Generum Plantarum," "Enchiridion Botanicum," and "Synopsis Coniferarum."

Endocarditis (ĕn-dō-cär-dī'tĭs), inflammation of the endocardium or lining membrane of the heart. It is generally of rheumatic character, and, though not often immediately fatal, it is a frequent cause of organic disease and deformity of the heart and its valves. It is frequently associated with pericarditis, and its occurrence is one of the results to be feared in rheumatic fever. It is usually attended by pain or discomfort about the heart, and is detected by auscultation. It produces peculiar murmurs in the heart, the significance of which can only be appreciated by the trained physician. The disease is very intractable. Sedatives, such as morphine, etc., may be useful in acute stages. The alkaline treatment for rheumatism is often advantageous. Patients sometimes, though not very frequently, entirely recover.

En'dor, ancient village of Palestine; on the N. declivity of Little Mt. Hermon, 18 m. SE. of Acre; long held by the Canaanites against the Israelites; celebrated as the scene of Saul's interview with the witch (I Sam. xxviii).

Endymion (ĕn-dĭm'ĭ-ŏn), in Greek mythology, a beautiful youth beloved by Diana (Selene), who cast him into an everlasting sleep. One tradition represents him as a son of Zeus, who granted him immortality and the privilege of sleeping as much as he desired. Some suppose that Endymion is a personification of the sun, or of the plunge of the setting sun into the sea.

En'emy, in international law, a state which has publicly declared war against another state, or against which the latter state has made such a declaration. This declaration must be made by a duly organized state or kingdom, for such a declaration by any turbulent body of men is not sufficient. Hostilities having been declared, every subject or citizen of the hostile nations becomes in theory an enemy of the opposing state, and all intercourse or communication between the citizens of one hostile state and those of the other is unlawful.

En'ergy, the ability to do mechanical work, regarded as a physical entity. Work is done whenever motion is produced against resistance. When a stone is lifted, work is performed against gravity. The energy of the body that moves the stone is diminished by the amount of the work done, and that of the weight is increased by the same amount. In this case the stone's energy is due to its position, and is called *potential* energy. If the stone be now dropped, its motion is rapidly accelerated, and it is able to do work (drive a nail, for instance) in virtue of its velocity. Its energy is now *kinetic*—due to its motion. No energy is lost or gained in the transformation—a fact which is formulated as the "conservation of energy." It is now recognized that this principle of conservation is of universal application. Many physical entities once believed to be forms of matter are now recognized as forms of energy, either kinetic or potential, and all the phenomena of the world constitute, or at least are accompanied by, a series of transformation from one of these forms into another, the total amount of energy involved remaining always the same. When a train stops, the kinetic energy of its motion is not lost, but reappears as the motion of molecules, constituting heat, in the brake shoes and on the wheels and rails. (See HEAT.) In like manner the atoms of oxygen in the air and of carbon in a scuttle of coal are the mutual possessors of potential chemical energy by virtue of their positions and the forces acting between them. When they combine, as the coal burns, this potential energy is transformed into the kinetic energy of heat.

But, although the sum of energy in the universe cannot be altered, it is not all in available form, and the available part of it is constantly diminishing. There is a constant tendency for all forms of energy to be transformed or "frittered away" into useless heat. mutual possessors of potential chemical energy as in a heat engine (steam or gas) only when

there is a difference of temperature in the engine (just as water can do work only by changing its level); and as this becomes equalized the availability of the heat for useful transformation vanishes. This fact is formulated as the "dissipation of energy."

The tendency of modern physics has been to dwell more and more on the part played by energy in the universe, and even to explain matter as depending upon it. An ether for the conveyance of radiations is postulated as existing throughout space, and matter is supposed to be an energized portion of this ether, differentiated from the rest either by its motion (kinetic energy), as in Lord Kelvin's vortex-ring theory of matter, or by some form of strain (potential energy) as in a more recent theory. There is also a tendency to reduce both forms of energy to the kinetic, on the theory that energy of position is really dependent on motions hitherto undiscovered. See FORCE.

Enfantin (äṅ-fäṅ-täṅ'), **Barthélemy Prosper**, 1796–1864; French socialist; b. Paris; was a commercial traveler, bank clerk, and member of the Carbonari. He got acquainted with Saint-Simon, 1825; was captivated by his ideas, and after his death founded a communistic paper, *Le Producteur*, and at the revolution of 1830, a politico-economical organization; was abandoned by his fellow Saint-Simonians because of his radical views. Published "La religion Saint-Simonienne," "La vie éternelle," and "Traité d'économie politique."

En'field, town of Middlesex, England; 10 m. N. of London; has a large government factory of small arms; gave its name to a rifle formerly used by various armies, but now superseded by breech-loading arms. Pop. (1901) 31,500.

Eng (right) and **Chang** (left), 1811–74; the Siamese Twins; b. Bangesau, Siam; offspring of a Chinese father and a Chino-Siamese mother; brought to the U. S., 1829, and after a number of tours of exhibition lived about twenty years as Eng and Chang Bunker near Mt. Airy, N. C. They differed widely in appearance, character, and strength, performed their physical functions separately, and were addicted to different habits, Chang being intemperate and irritable, Eng sober and patient. Both were married and had large families of children, a number of whom died young, but none exhibited any malformation.

The connection of the Siamese twins was near the navel. The connecting band was a few inches long, after having elongated a little during their life, and 8 in. in circumference (2½ in diameter). Inside the skin there was normal subcutaneous and muscular tissue, portions of the muscles of one crossing those of the other. The interior was occupied by the prolongations of the peritoneum crossing from one to the other. The livers of the twins were located in close proximity to the connecting band, and connected with each other by small blood vessels, which were lined with a thin layer of genuine liver tissue.

Engadine (ĕn-gă-dēn'), or **Engadin'**, upper part of the valley of the Inn River, in the canton of Grisons, Switzerland; 65 m. long, with an average width of 1½ m.; separated by the Bernina Mountains from the Valtelline. For 30 m. the mean height is 5,500 ft., while the village of St. Moritz on the banks of the Inn is at a height of 6,090 ft. The Engadine has become a popular resort for tourists, who are attracted by the beauty of the valley. The inhabitants, a pious, simple class of peasants mostly Protestants, number abt. 12,000, and speak a peculiar Romanic dialect, called Ladin.

Enga'no, island of Malaysia; 75 m. from the SW. coast of Sumatra; area, 128 sq. m.; has a good harbor, but is mostly surrounded by coral reefs. The people, of Malayan race, and included in the Dutch Sumatran Govt. of Benkulen.

Engedi (ĕn-gē'dī), town several times mentioned in the Bible; and also called Hazezontamar (city of palm trees); its palm trees have now disappeared. It stood on the W. side of the Dead Sea, at a point about equally distant from its N. and S. extremities, and in a very fertile spot near the fountain which gave it its shorter name. There are numerous caves in the vicinity, which served as hiding places for David (I Sam. xxiv, 1–4) and his followers.

Eng'elbert, Saint, 1185–1225; son of the German ruler; Count of Berg; was cathedral provost, 1199–1206; became Archbishop of Cologne and elector of the empire of Germany, 1216; paid off the debt of the electorate, enlarged its territories, and reformed its administration. When Emperor Frederick II went to Italy, Engelbert became the principal regent in Germany. He reformed the corrupt clergy, checked the power of the nobles, and zealously advanced that of the Church. His energy and rigor made many enemies, and he was murdered by his own nephew, at Gevelsberg, Westphalia.

Eng'elmann, George, 1809–84; German-American botanist; b. Frankfort on the Main; for a time connected with the Univ. of Berlin; settled in St. Louis, Mo., 1835, where he became prominent as a physician; devoted especial attention to N. American botany; many of his papers appear in government reports. His herbarium and library became the property of the Missouri Botanical Garden at St. Louis.

Eng'els, Friedrich, 1820–95; German socialist; b. Barmen; best known as colleague of Karl Marx; lived in London after 1869; wrote "The Working Classes in England," and works on the family, on Feuerbach's philosophy, and on socialism.

Enghien (ŏṅ-găṅ'), town of Belgium, province of Hainaut; 20 m. SW. of Brussels; has a chateau of the Aremberg family, and manufactures of cotton and linen. The family of Bourbon-Condé derived from it the title of duke.

Enghien, d', Louis Antoine Henri de Bourbon (Duc), 1772–1804; French prince; b. Chantilly; eldest son of Duke of Bourbon;

became an *Émigré*, 1789, and, 1792, joined the army of the Prince of Condé; fought against the French republic until 1799; in 1804 married Princess Charlotte of Rohan-Rochefort; became a resident of Ettenheim in Baden. He was seized by order of Bonaparte, carried to Vincennes, tried by a military court, and shot, March 21, 1804, on pretext that he was an accomplice of Cadoudal's conspiracy against Bonaparte. This act excited indignation, as it was believed that D'Enghien was not guilty.

En'gine, any contrivance for the production of a mechanical effect. The word is commonly applied only to the heavier and more powerful classes of machinery, especially to the prime movers, such as heat engines, air, gas, and steam engines which have some complexity of construction. Other contrivances, as windmills and water wheels, might properly be called engines, but are less frequently so called. It may be generally described as a "train of mechanism" consisting of several elementary parts so "paired" and enchained that their motion must be mutually dependent and occurring at the same time, and of fixed relative range and power. In this sense the engine is a contrivance for the performance of a given task in a specified manner through the operation of one or more series of connected parts, driven from a source of energy, and applying that energy to the act or series of acts which constitute the specified task of the machine.

Engines may be classified as (1) prime movers, (2) secondary movers, (3) machines transmitting energy from a mover to a follower, and (4) machines performing special tasks. The classes named may be illustrated by (1) the heat engines, (2) compressed-air engines, (3) dynamometers of the transmission kind, and (4) machine tools, spinning machines, and looms or other machines substituting mechanical action for manual labor. The inventions of Savery, Worcester, and Newcomen in the earlier days, and all later machines of the same class have been known as steam engines. The common machinists' lathe is also called an engine lathe. The invention of Blanchard for turning irregular forms was also called an engine. A geometrical lathe used by engravers for producing geometrical patterns, such as are seen on the cases of watches and on bank notes, is also called a "rose engine." Electrodynamic machinery includes the electro-dynamic *engine*, which is often substituted for the steam engine or water wheel, the power being supplied from the electric current. Catapults and other machines used by the ancients in warfare were called engines of war, as our modern guns are called engines of destruction. The calculating machine invented by Babbage was called a "difference engine." As most commonly used, the term "*engine*" is applied to massive machines or those giving power. Engines as motors are distinguished according to the source of power, as steam engines, air engines, hydraulic engines, electro-magnetic engines; or the purpose for which the power is applied, as fire engine, pumping engine, locomotive engine; or some peculiarity of construction or operation, as single-acting, double-acting, condensing, compound, cross-compound, tandem, high- or low-pressure engines. See LOCOMOTIVE ENGINE.

Engineer'ing, art of construction. The profession of engineering has for its province the construction of all classes of works, whether static or dynamic, civil or military, public or private. It has for its basis the constructive arts, and for its code applied mechanics, and the physical sciences. The following classifications may meet the requirements of modern times as logically as any, but the continual increase in the complexity of construction is constantly modifying the extent and character of these various branches of the great constructive profession:

1. Military engineering, the construction of works for offensive and defensive warfare, comprises army or military engineering proper, and naval engineering, including the construction of engines, ships, and armor; and the construction of ordnance, which last is almost a profession by itself.

2. Civil engineering, now restricted largely by the assignment of special branches to other departments, embraces construction of "public works," as railroads, canals, harbors, and bridges.

3. Mining engineering assumes charge of mining construction and operations from the preliminary location to the final operation of the completely organized and working establishment.

4. Mechanical engineering, the designing and construction of all machinery; sometimes termed, in contradistinction from the preceding, "dynamic" engineering, as having to do only with moving structures, while civil engineering, concerned mainly with permanent structures, is sometimes called "static" engineering.

5. Electrical engineering, a modern branch, dealing with the design, construction, and operation of the mechanism employed in the production, transmission, and utilization of electrical energy, such energy being derived by transformation from some other form of energy, through an appropriate system of "prime motors."

Architecture should probably be classed as a branch of engineering, in which are combined the arts of carpentry and general construction with the fine arts, these latter being essential in all successful architecture in decoration. Civil engineering and architecture are often classed together. See HYDRAULICS; ROADS; SURVEYING; TUNNELS AND TUNNELING.

Eng'land, that part of the island of Great Britain which lies S. of Scotland and E. of Wales, and is the principal member of the United Kingdom of Great Britain and Ireland. The name England sometimes includes Wales, which for administrative purposes was united to England, 1535. England, in this extended sense, is bounded N. by Scotland, E. by the German Ocean, S. by the Straits of Dover and the English Channel, SW. by the Atlantic, and W. by St. George's Channel and the Irish Sea; greatest length, N. and S., 400 m.; greatest breadth, 280 m.; seacoast, from one headland to another, about 1,200 m. in length; area,

28,324 sq. m.; pop. (1901) 32,527,843; metropolis, London. The coast is unbroken, and there are few bays or natural harbors, a deficiency compensated for to some extent by the existence of several estuaries, among which the Humber and Thames are the most important. A flat shore predominates; where cliffs occur, they are, as a rule, composed of chalk, sand, or clay. N. England is intersected by a range of mountains forming the water divide between the German Ocean and the Irish Sea; these mountains are called the Pennine chain. The valley of the Thames is bounded on the N. and S. by chalk hills, affording generally excellent pasturage. The S. chalk hills are known as The Downs, and attain scarcely an elevation of 1,000 ft. The N. Downs extend to the coast of Kent, at Dover, where they form white cliffs. These two ranges bound a region called the Weald, one of the most productive agricultural districts of the country. The so-called "Dartmoor Forest" of Devon is a desolate moorland rising in Yes Tor to 2,077 ft. The fertile plain of Cheshire and the valley of the Severn form the natural boundary between England and the mountain region of Wales, which is frequently distinguished as the Cumbrian Mountains, though "Welsh Hills" is the more popular name.

The rivers of England are small streams as compared with rivers of America, but they all carry an abundant supply of water throughout the year, and many of them are navigable for a considerable distance. The hills of S. Wales are distinguished by their barrenness. There are numerous lakes in the Cumbrian Mountains, the so-called "Lake District," but, though distinguished for picturesque beauty, the largest among them, Windermere, covers an area of only 4 sq. m. Wales is even poorer in lakes. Noted for their mineral springs are Harrogate, Malvern, Cheltenham, Scarborough, Tunbridge Wells, Epsom, Leamington, and Droitwitch. The climate is mild and equable, owing to the influence of the Gulf Stream. The mean annual temperature of England is about 49.5°; the rainfall in the greater portion does not exceed 30 in. a year. Snow falls but rarely, except in the hills. The chief agricultural products are wheat, barley, oats, and root crops. The greater part of the holdings over one acre in size are either rented or partly rented and partly owned. The counties of Cheshire, Gloucester, and Leicester (Stilton) are noted for their cheese; Devon for its cream; Cambridge, Suffolk, York, Somerset, and Oxford, besides the counties already named, for their butter.

For information on mines, manufactures, and commerce, see GREAT BRITAIN.

England still retains an Established (State) Church, of which the sovereign is the supreme head (see ENGLAND, CHURCH OF). The Roman Catholics number 1,500,000. Elementary education in England and Wales is under the control of a board of education, and is administered by committees. So far as the Church of England still has authority, religious education, according to its tenets, is compulsory during a part of the regular school hours. The authorities under the board of education must not pay for religious instruction in schools provided by them; in schools not provided by them they can neither impose nor forbid such instruction. The school age is five to fourteen, but children employed in agriculture are partially exempt at eleven. The secondary schools include Eton College, and Rugby and Harrow schools, and give a general education to pupils from twelve to sixteen. Middle-class education is mainly left to private enterprise. There are ten universities: Oxford, Cambridge, Durham, Manchester, Leeds, Liverpool, Sheffield, Birmingham, London, and the Univ. of Wales and fifteen colleges, besides four university colleges for women, medical, technical, and art schools. Until 1900 London Univ. was merely a body of examiners. For the purposes of government, England and Wales are divided into sixty-two administrative counties. The crown is represented in each county by a lord lieutenant, a sheriff, and justices of the peace. For each administrative county there is a popularly elected council. The councilors are elected by the rate payers for six years. The judicial systems of England and of the U. S. are very similar, the jurisprudence of both being based upon the "common law," only occasionally, in admiralty and ecclesiastical cases, is recourse had to Roman or canon law.

England first became known to the W. world through the Phœnicians and Massilians, who traded with it for tin; but its real history began with the invasion by Cæsar, 55 B.C. The rule of the Romans, who called the present island of Great Britain *Britannia* lasted till the beginning of the fifth century. Abt. 449 the Saxons, Jutes, and Angles invaded the country. Egbert, of Wessex, called the first "King of all England," united the various Teutonic kingdoms of the Angles, Saxons, and Jutes, 629. Abt. 790 the Danes began their invasions. Though driven out a century later by Alfred the Great, they returned, and for twenty-four years, 1017–42, were masters of the kingdom. In 1042 the crown again devolved on an Anglo-Saxon prince, Edward the Confessor, whose rule was but nominal, six powerful earls, Danish and English, dividing the country. With the Norman conquest, 1066, feudalism was established, and the foundation laid of a still powerful aristocracy. Henry II, crowned 1154, founded the house of Plantagenet, which in direct line ruled until 1485. His younger son John (Lackland) lost nearly all the possessions of the English sovereigns in France, and was compelled by the barons, backed by the people, to sign the Magna Charta (*q.v.*). In 1265 the first English Parliament was convened. In 1282 Edward I, by conquest, united Wales to England. The Hundred Years' War, 1337–1453, led to the surrender of all English possessions in France but Guines and Calais, and to the entire fusion of the Normans and Saxons. The Wars of the Roses, 1455–85, ended in the establishment of the Tudor dynasty under Henry VII. The greatest event in the reign of his son Henry VIII was the separation of the Church of England from Rome and the introduction of the Reformation. Mary, 1553–58, reëstablished

papal authority; but Elizabeth restored the royal supremacy of the Church, and also raised England to a higher position than ever before. The entire submission of Ireland was accomplished during her reign, and England entered on her career as a colonizer.

James VI, 1603–25, first of the Stuart line, united Scotland and England, though the legislative union was not consummated till 1707. During the reign of Charles I the Puritan emigration to New England took place, and the Civil War raged, ending in the overthrow of royalty, the beheading of Charles, 1649, and the ascendency of Oliver Cromwell as "Lord Protector of the Commonwealth." Monarchy was restored under Charles II in 1600. The revolution of 1688 drove James II into exile, and placed William and Mary on the throne. The War of the Spanish Succession, begun under William, 1701, was continued by his successor, Anne, 1702–14; resulted in the Continental victories of Marlborough, and led to the conquest of Gibraltar. On May 1, 1707, the complete union of England and Scotland was accomplished. For further history, see GREAT BRITAIN.

CHRONOLOGICAL TABLE OF THE SOVEREIGNS OF ENGLAND

Saxon House of Cerdic.—Egbert, first King of all England, 827–36; Ethelwulf, 839–58; Ethelbald, 858–60; Ethelbert, 858–66; *Ethelred, 866–71; Alfred the Great, 871–901; Edward the Elder, 901–25; Athelstan, 925–40; Edmund, 940–46; Edred, 946–55; Edwy 955–58; Edgar, 958–75; Edward the Martyr, 975–79; Ethelred II, the Unready, 978–1016; Edmund Ironside, 1016.

Danes.—Canute, 1017–35; Harold I, 1035–40; Hardicanute, 1040–42.

House of Cerdic.—Edward the Confessor, 1042–66;* Harold II, 1066.

The House of Normandy.—William I, the Conqueror 1066–87; †William II, Rufus, 1087–1100; Henry I, Beauclerc, 1100–35; Stephen of Blois, 1135–54.

The House of Plantagenet.—Henry II, 1154–89; *Richard I, Cœur de Lion, 1189–99; John, Lackland, 1199–1216; Henry III, 1216–72; Edward I, 1272–1307; †Edward II, 1307–27; Edward III, 1327–77; †Richard II, 1377–99 (deposed).

The House of Lancaster.—Henry IV, 1399–1413; Henry V, 1413–22; †Henry VI, 1422–61 (deposed and executed).

The House of York.—Edward IV, 1461–83; †Edward V, 1483; *Richard III, 1483–85.

The House of Tudor.—Henry VII, 1485–1509; Henry VIII, 1509–47; Edward VI, 1547–53; Mary I, the Bloody, 1553–58; Elizabeth, 1558–1603.

The House of Stuart.—James I (VI of Scotland), 1603–25; Charles I, 1625–49.

Commonwealth, 1649–59 (see CROMWELL).

The House of Stuart Restored.—Charles II, 1660–85; James II 1685–88 (expelled); William III of Orange and Mary II (d. 1694), 1689–1702; Anne of Denmark, 1702–14.

The House of Hanover.—George I, 1714–27; George II, 1727–60; George III, 1760–1820; George IV (regent in 1811), 1820–30; William IV, 1830–37; Victoria, 1837–1901; Edward VII, 1901.

England, Church of, that portion of the Christian Church which has existed in England since the time of St. Augustine (or Austin). Christianity received, in the Roman period, a serious check by the invasion of the Saxons and the consequent neglect or persecution of the native Christians, but on the coming of St. Augustine, sent over in 596 by Gregory the Great, Ethelbert, King of Kent, and most of his subjects adopted Christianity. Other missionaries followed St. Augustine, a bishop's see was established at London early in the seventh century, and the conversions of many kingdoms followed. To promote the union of the churches thus founded in England with the Church of Rome a grand council was summoned at Hertford in 673, when uniformity was secured among all the English churches, and the see of Canterbury made supreme.

Under Anselm, 1093–1109, the church was practically emancipated from control of the state, and the power of the pope became supreme. The result was an increase in monasticism and the prevalence of the greatest abuses under the cloak of church privilege. A reaction set in during the reign of Henry III, and in the reign of Edward I the new system of parliament came as an effective rival of the church synods, and various acts restrained the power of the clergy. In the fourteenth century the teaching of Wyclif promised to produce a thorough revolt from Rome; but the Wars of the Roses prevented matters coming to a head. When Henry VIII resolved to recast the English Church there was no effective protest. Not long after, Parliament abolished appeals to the see of Rome, dispensations, licenses, bulls of institution for bishoprics, the payment of Peter's pence, and the annates. In 1534 the papal authority was set aside by act of Parliament, and by Act of 1535 Henry assumed the title of Supreme Head of the Church of England.

These acts, although they severed the connection between the English Church and the Holy See, did not alter the religious faith of the church. But under Edward VI the Duke of Somerset caused a more thorough reform of the doctrines to be made. At his instigation Parliament, in 1547, repealed the statute of the six articles promulgated by Henry VIII, and in 1551 a new confession of faith was embodied in forty-two articles. With the reign of Mary the old religion was reëstablished; and it was not till the reign of Elizabeth that the Church of England was finally instituted in its present form. The doctrines of the church were again modified, and the forty-two articles reduced to thirty-nine. In 1559 the Acts of Supremacy and Uniformity were passed with the object of bringing about the entire subjugation of church and people in religious matters to royal authority. Under Charles I an attempt was made through Laud to reduce all the churches of Great Britain under the jurisdiction of the bishops. After the death of Laud, Parliament abolished the episcopal government, and condemned everything contrary to the doctrine of the Church of Geneva. As soon as Charles II was restored, the ancient forms of ecclesiastical government and public worship were reëstablished and three severe measures were passed against nonconformity, namely, the Corporation Act of 1661, the Act of Uniformity (1662), and the Test Act (1673). In the reign of William III the division into high and low churchmen occurred.

The established church of England has always adhered to the Episcopacy. Its creeds are "The Apostles," "The Nicene," and "The Athanasian." Under the sovereign as supreme head, the church is governed by two archbishops and thirty-five bishops. The Archbishop

* Killed in battle. † Murdered or executed.

of Canterbury is styled the Primate of all England. The archbishops and bishops, to the number of twenty-four, have seats in the House of Lords, and are styled spiritual lords. The form of worship is directed by the Book of Common Prayer. The clergy number about 25,000. The doctrines of the church are contained in the Thirty-nine Articles. They affirm the old orthodox doctrines of the Trinity and incarnation, the Augustinian views on free will, total depravity, divine grace, faith, good works, election, and the Protestant doctrines on the Church, purgatory, and the sacraments of baptism and the Lord's Supper. In the political sections they are purely English, and teach the doctrine of the spiritual as well as temporal supremacy of the sovereign as the supreme governor of the Church of England.

Eng'lish Chan'nel, that portion of the Atlantic which separates England from France; extends on the English side from Dover to Land's End, and on the French from Calais to the island of Ushant. On the E. it communicates with the German Ocean by the Strait of Dover, 21 m. wide, and on the W. opens into the Atlantic by an entrance 100 m. wide; greatest width, about 150 m. On the English side lies the beautiful Isle of Wight. Guernsey, Jersey, and the other Channel Islands are situated off the N. coast of France.

English Har'bor, one of the finest ports in the W. Indies; on the S. side of Antigua; capable of receiving vessels of the largest class; has a dockyard and naval hospital.

English Lan'guage, the tongue now spoken in England and its colonies, and throughout the greater part of the United States of America. It is a descendant of the Germanic tongues spoken by the Angles, Saxons, Jutes, and other tribes that migrated from N. Germany and had occupied the greater part of Britain by about the fifth century A.D. These tongues collectively are often called Anglo-Saxon, but the change to modern English has been gradual, and it is difficult to assign the time of passage from one to the other. Scholars now generally prefer to speak of the language as English (as its speakers themselves called it) from the earliest Germanic occupation. The progressive changes in the tongue may be divided into three periods: that of Old English, till abt. 1200; Middle English, to 1500; and Modern English, since that date. Territorially there have always been at least two dialects, a N. and a S., and in later times a midland dialect, which has become the literary form of modern English. "Scotch" is the chief modern descendant of the N. dialect, and the Dorsetshire and allied idioms, which have now no place in literature, of the S. dialect. The original N. dialect was the Anglian, comprising the Northumbrian and Mercian, and the original S. dialect included the Saxon and the Kentish. Modern English, as spoken by cultivated persons, descends from the Mercian through the Midland.

Old English, or Anglo-Saxon, was a purely Germanic and rather fully inflected language, whereas the modern tongue is noted for absence of inflectional forms and for its very full admixture of words from other languages, making it rich in synonyms. The loss of inflection has been gradual, and is still going on —witness, for instance, the general discontinuance of the subjunctive mood at the present day. The admixture of foreign words has been due to contact, physical and mental, with various foreign peoples. From the Danish invaders come numerous place names, while others descend from the original Celtic inhabitants. The Norman conquest, with the ensuing use of French by the nobility for many generations, introduced a large Norman-French element, derived ultimately from the Latin. The uses of Saxon and Norman terms, originally synonymous, often throw light on the relations of the conquerors and the conquered. Thus the words ox, calf, sheep, and pig, denoting the live animals, are Anglo-Saxon, whereas the flesh of the same creatures, prepared for the table, is called respectively beef, veal, mutton, and pork—words derived from the French names *bœuf*, *veau*, *mouton*, and *porc*, by which the animals (whether living or dead) are called in that tongue. This is due to the fact that the Saxon farmer or laborer knew the animals only in the field—the Norman noble, only on the table. Besides the Latin words introduced through Norman French, the Roman occupation of Britain has left some traces in place names, and other Latin terms were introduced directly by monks and scholars. Latin and Greek are both used freely to-day in coining new terms in science.

Owing to this admixture of words from other languages, English has an extremely large and rich vocabulary. Recent dictionaries record as many as 300,000 words and phrases, and even so, many thousands of doubtful, obsolete, or technical words are omitted from these works. Of course, only a fraction of these words are used by any one writer or speaker. Shakespeare, whose vocabulary is considered a rich one, used from 15,000 to 20,000 words, as estimated by different writers. Max Müller says that a farm laborer gets along with about 300 words, but this would seem too low an estimate, as actual counts of words used by young children run from 489 for a two-year-old girl to 2,688 to a boy of six. Prof. E. S. Holden reports that his own vocabulary comprises 33,456 words, as tested by checking those in a dictionary, and E. H. Babbitt, who has tested and recorded the vocabularies of many students, gives the average as somewhat below 60,000 words. See ANGLO-SAXON LITERATURE; ETYMOLOGY.

English Lit'erature. Before any English literature, in the strict sense of the term, existed, four literatures had arisen in England—the Celtic, Latin, Anglo-Saxon, and Anglo-Norman. The first includes such names as those of Taliesin, Llywarch Hen, Aneurin, and Merlin or Merddhin. The Latin literature prior to the Conquest presents those of Aldhelm, Bede, Alcuin, Asser, Ethelwere, and Nennius. For Anglo-Saxon literature see the article under that title. With the coming of the Normans, although the Anglo-Saxon Chronicle was continued until 1154, the native language practically ceased for a time to be em-

ployed in literature, Latin being employed in law, history, and philosophy, French in the lighter forms of literature. The Norman *trouvère* displaced the Saxon *scop*, or gleeman, introducing the *fabliau* and the *romance*. By the *fabliau* the literature was not greatly influenced until the time of Chaucer; but the *romance* attained an early and striking development in the Arthurian cycle, founded upon the legends of Geoffrey of Monmouth's "Latin History of the Britons," 1147, by Geoffrey Gaimar, Maistre Wace, Walter May, and other writers of the twelfth century. The Latin literature included important contributions to the scholastic philosophy by Alexander Hales (d. 1245), Duns Scotus (d. 1308), and William of Occam (d. 1347), the philosophic works of Roger Bacon (1214–92), the Golias poems of Walter Map, and a long list of chronicles or histories, either in prose or verse, by Eadmer (d. 1124), Geoffrey of Monmouth (d. 1154), and many others.

The first English writings after the Conquest are rhyming chronicles and such works as the "Ancren Riwle" (?Richard Poor, d. 1237), "Dialogue between the Owl and the Nightingale" (? Nicholas of Guildford), and "Land of Cockayne" (? Michael of Kildare), the "Song against the King of Almaigne," and a "Dialogue between the Body and the Soul." To this pre-Chaucerian period belong also several English translations of French romances. Between the beginning and middle of the fourteenth century the English speech had entered upon a new phase of development in the absorption of Norman-French words. A rapid expansion of the literature followed, having as the foremost figure that of Chaucer (1340–1400), who, writing at first under French influences, and then under Italian, became in the end the most representative English writer of the time. In prose the name of John Wycliffe (1324–84) is preëminent, the English version of Mandeville's "Travels" being apparently of later date.

The period from the time of Chaucer to the appearance of Spenser, that is, from the end of the fourteenth to near the end of the sixteenth century, is a very barren one in English literature, in part probably owing to foreign and domestic wars, the struggle of the people toward political power, and the religious controversies preceding and attending the Reformation. The center of poetic creation was for the time transferred to Scotland, where James I (1394–1437) headed the list which comprises Andrew de Wyntoun (fifteenth century), Henry the Minstrel or Blind Harry (d. after 1492), Robert Henryson (d. before 1508), William Dunbar (1460–15), Gavin Douglas (1474–1522), and Sir David Lyndsay (1490–1557). In England the literature was chiefly polemical, the only noteworthy prose prior to that of More being that of Reginald Pecock (1390–1460), Sir John Fortescue (1395–1485), the "Paston Letters" (1422–1505), and Malory's "Morte d'Arthur" (completed 1469–70); the only noteworthy verse, that of John Skelton (1460–1529).

It was now that several events of European importance combined to stimulate life and enlarge the mental horizon—the invention of printing, or rather of movable types, the promulgation of the Copernican system of astronomy, the discovery of America, the Renaissance, and the Reformation. The Renaissance spread from Florence to England by means of such men as Colet, Linacre, Erasmus, and Sir Thomas More (1480–1535), the last noteworthy as at the head of a new race of historians. Important contributions to the prose of the time were the Tyndale New Testament, printed in 1525, and the Coverdale Bible (1535). The first signs of an artistic advance in poetic literature are to be found in Wyatt (1503–42) and Surrey (1516–47), who nationalized the sonnet, and of whom the latter is regarded as the introducer of blank verse. The drama, too, had by this time reached a fairly high stage of development. The mystery and miracle plays, after the adoption of the vernacular in the fourteenth century, passed from the hands of the clergy into those of the laity, and both stage and drama underwent a rapid secularization. The morality began to embody matters of religious and political controversy, historical characters mingled with the personification of abstract qualities, real characters from contemporary life were introduced, and at length farces on the French model were constructed, the interludes of John Heywood (d. 1565) being the most important examples. To Nicholas Udall (1504–56) the first genuine comedy, "Roister Doister," was due, this being shortly afterwards followed by John Still's "Gammer Gurton's Needle" (1566). The first tragedy, the "Ferrex and Porrex, or Gorboduc" of Sackville (d. 1608) and Norton (d. 1600), was performed in 1561, and the first prose play, the "Supposes" of Gascoigne (d. 1577) in 1566. The most noteworthy figures among the early Elizabethans are those of Sidney (1554–86) and Spenser (1552–99). In drama Lyly, Peele, Greene, Nash, and Marlowe (1564–93) are the chief immediate precursors of Shakespeare (1564–1606), Marlowe alone, however, being at all comparable with the great master. Contemporary and later dramatic writers were Ben Jonson (1573–1637), the second great Elizabethan dramatist, Middleton (d. 1627), Marston (better known as a satirist), Chapman (1557–1634), Thomas Heywood, Dekker (d. 1639), Webster (seventeenth century), Ford (1586–1639), Beaumont (1586–1616), and Fletcher (1576–1625), and Massinger (1584–1640). The minor poets include Michael Drayton (1563–1631), Samuel Daniel (1562–1619), John Davies (1570–1626), John Donne (1573–1631), Giles Fletcher (1580–1623), and Phineas Fletcher (1584–1650), Drummond of Hawthornden (1585–1649). In Elizabethan prose the prominent names are those of Roger Ascham (1515–68), Lyly the Euphuist (1553–1606), Hooker (1554–1600), Raleigh (1552–1618), Bacon (1561–1626), the founder in some regards of modern scientific method, Burton (1576–1640), Herbert of Cherbury (1581–1648), and Selden (1584–1654). The issue of the authorized version of the Bible in 1611 may be said to close the prose list of the period.

After the death of James I the course of literature breaks up into three stages, the first

from 1625 to 1640, in which the survivals from the Elizabethan age slowly die away. The "metaphysical poets," Cowley, Wither, Herbert, Crashaw, Habbington, and Quarles, and the cavalier poets, Suckling, Carew, Denham, all published poems before the close of this period, in which also Milton's early poems were composed, and "Comus" and "Lycidas" published. The second stage (1640–60) was almost wholly given up to controversial prose, the Puritan revolution checking the production of pure literature. In this controversial prose of the time Milton was easily chief. With the Restoration a third stage was begun. Milton turned his new leisure to the composition of his great poems; the drama was revived, and Davenant and Dryden, with Otway, Southerne, Etherege, Wycherley, Congreve, Vanbrugh, and Farquhar in their first plays are the most representative writers of the period. Butler established a genre in satire, and Marvell as a satirist in some respects anticipated Swift; Roscommon, Rochester, and Dorset contributed to the little poetry; while in prose we have Hobbes, Clarendon, Fuller, Sir Thomas Browne, Walton, Cotton, Pepys and Evelyn, John Bunyan, Locke, Sir William Temple, Owen Feltham, Sir Henry Wotton, James Harrington, and a crowd of theological writers, of whom the best known are Jeremy Taylor ("Spencer of prose" and "Shakespeare of divines"), Richard Baxter, Robert Barclay, William Penn, George Fox, Isaac Barrow, John Tillotson, Stillingfleet, Bishop Pearson, Sherlock, South, Sprat, Cudworth, and Burnet. Other features of the last part of the seventeenth century were the immense advance in physical science under Boyle, Isaac Newton, Harvey, and others, and the rise of the newspaper press.

Dryden's death in 1700 marks the commencement of the so-called Augustan age in English literature. During it, however, no greater poet appeared than Pope (1688–1744), in whom sagacity, wit, and fancy take the place of the highest poetic faculty, but who was a supreme artist within the formal limits of his conception of metrical art. Against these formal limits signs of reaction are apparent in the verse of Thomson (1700–48), Gray (1716–71), Collins (1720–59), Goldsmith (1728–74), and in the productions of Macpherson and Chatterton. The poets Prior (1664–1781), Gay (1688–1732), and Ambrose Phillips (1671–1749) inherit from the later seventeenth century, Gay being memorable in connection with English opera; and there are a large number of smaller poets. It is in prose that the chief development of the eighteenth century is to be found. Defoe (1661–1731) and Swift (1667–1745) led the way in fiction and prose satire, Steele (1672–1729) and Addison (1672–1719), working on a suggestion of Defoe, established the periodical essay, Richardson (1689–1761), Fielding (1707–54), Smollett (1721–71), and Sterne raised the novel to sudden perfection. Goldsmith also falls into the fictional group as well as into those of the poets and the essayists. Johnson (1709–84) exercised during the latter part of his life the power of a literary dictator, with Boswell (1740–95) as literary dependent. The other chief prose writers were Bishop Berkeley (1685–1753), Arbuthnot 1675–1735), Shaftesbury (1671–1713), Bolingbroke (1678–1751), Burke; the historians David Hume (1711–76), William Robertson (1721–93), Edmund Gibbon (1737–94), the political writers Wilkes and Junius; the economist and moral philosopher, Adam Smith (1723–90); the philosophical writers Hume, Bentham (1749–1832), and Dugald Stewart (1753–1828), the scholars Bentley (1662–1742), Sir William Jones (1746–94), and Richand Porson (1759–1808); the theologians Atterbury, Butler (1692–1752), Warburton, and Paley; and some playwrights, of whom Rowe, John Home, Colley Cibber, Colman the elder, Foote, and Sheridan were the most important.

With the French Revolution, or a few years earlier, the modern movement in literature may be said to have commenced. The departure from the old traditions, traceable in Gray and Collins, was more clearly exhibited in the last years of the century in Cowper (1731–1800) and Burns (1759–96), and was developed and perfected in the hands of Blake (1757–1828), Bowles (1762–1850), and the "Lake poets," Wordsworth (1770–1850), Coleridge (1772–1834), and Southey (1774–1843), but there were at first many survivals from the poetic manner of the seventeenth century. Among the earlier poets of the century, also, were George Crabbe (1754–1832), Sir Walter Scott (1771–1832), Hogg (1772–1835), Campbell (1777–1844), James Montgomery, Mrs. Hemans, and Bryan Waller Procter ("Barry Cornwall"). A more important group was that of Byron (1788–1824), Shelley (1792–1822), and Keats (1796–1821), with which may be associated the names of Leigh Hunt (1784–1859), Thomas Moore (1779–1852), and Landor (1775–1864). Among the earlier writers of fiction there were several women of note, such as Maria Edgeworth (1767–1849) and Jane Austen (1775–1817). The greatest name in fiction is unquestionably that of Scott. Other prose writers were Mackintosh, Malthus, Hallam, James Mill, Southey, Robert Hall, John Foster, Thomas Chalmers, Hannah More, Cobbett, William Hazlitt, Sydney Smith, Francis Jeffrey, Lord Brougham. In the literature since 1830 poetry has included as its chief names those of Praed, Hood, Aytoun, Lord Houghton, Sidney Dobell, Alexander Smith, Gerald Massey, Charles Mackay, Philip James Bailey, William Allingham, Elizabeth Barrett Browning, Coventry Patmore, Lord Lytton (Owen Meredith), Arthur Hugh Clough, Matthew Arnold, Dante G. Rossetti, Robert Buchanan, William Morris, Lewis Morris, Jean Ingelow, Swinburne, and last and greatest, Tennyson and Browning. A brilliant list of novelists for the same period includes Marryat, Michael Scott, Lord Lytton, Ainsworth, Benjamin Disraeli (Earl of Beaconsfield), Dickens, Thackeray, Charles Kingsley, Charlotte Brontë, Wilkie Collins, Mayne Reid, George Macdonald, Charles Reade, George Eliot, Anthony Trollope, William Black, Thomas Hardy, R. D. Blackmore, George Meredith, and others. To the historical and biographical list belong, among others, Alison, Macaulay, Carlyle, Froude, Lecky, Kinglake, John Richard Green,

E. A. Freeman, Hill Burton, Stubbs, Dean Stanley, David Masson, John Morley, Leslie Stephen. Prominent among the theological writers have been Dr. Newman, Whately, Augustus and Julius Hare, Trench, Stanley, Maurice, Hamilton, Alford, F. W. Robertson, Stopford Brooke, Liddon, Isaac Taylor, Jowett, James Martineau, Tulloch, and Caird. In science and philosophy among the chief writers have been Whewell, Sir W. Hamilton, Mansel, John Stuart Mill, Alexander Bain, Hugh Miller, Charles Darwin, Huxley, Tyndall, Max Müller, Herbert Spencer, T. H. Green. Of the other prose writers of importance the chief are De Quincey, Harriet Martineau, Sir Arthur Helps, Ruskin, Matthew Arnold, W. E. Gladstone.

English Pale, called also the IRISH PALE, in history, that part of Ireland which was already under English law before the final subjugation of Ireland. Nominally it may be defined as corresponding with the present province of Leinster, besides Cork, Kerry, Waterford, Tipperary, and Limerick; but the actual Pale, though of extremely variable limits, scarcely ever reached the dimensions indicated above. The counties of Dublin, Meath, Carlow, Kilkenny, and Louth were almost always within the Pale; Wexford and Waterford, though hardly within the Pale, were firmly English; while Wicklow and Kildare, though nominally within the Pale, were Celtic, and to a considerable extent independent.

Engrav'ing, process of cutting grooves or small hollows in a hard surface, especially letters, characters, or works of art; by extension, carving a surface with characters in relief, as in wood engraving. Engraving differs from chasing in that the surface is cut away, while in chasing it is merely depressed or beaten down. Inscriptions cut in marble or stone, the figures, ornamental designs, and lettering, on monumental brasses or bronzes, or on articles of household use and for personal ornament, come under this head. Engraving to produce designs to be transferred to paper was probably first practiced on wood. It is supposed that the art was introduced from China into Europe, but it was not practiced in Europe till about the close of the fourteenth century, reaching a high degree of excellence early in the sixteenth. Abt. 1610, wood engraving began to decline, and at length was applied only to tapestry and calico printing, but was revived in recent times, the chief impulse being given to it by the founding in England of the *Penny Magazine* (1832); but with the introduction of photo-engraving it again declined. Plate engraving was invented about the middle of the fifteenth century. The earliest works were executed on tin, zinc, or iron; but copper soon became recognized as the metal best adapted for engraving, and until the invention of steel engraving in the nineteenth century it was used almost exclusively.

Xylography, or wood engraving, is the earliest, simplest, and cheapest form of engraving. Various woods are used, boxwood exclusively for fine work, and mahogany, maple, and pine, for coarse work. The face of the block, freed from inequalities, is covered with a light coat of flake white mixed with gum water. It then retains pencil marks and India ink. The work of the wood engraver is precisely the opposite of that of the plate engraver. The latter cuts the lines of the drawing into the metal; the former cuts away the surface around the lines, leaving them in relief.

Plate engraving, or engraving on metal plates, may be classed as etching, line, stipple or chalk, mezzotint, and aquatint. The instruments used are the etching needle or point, consisting of a piece of stout steel wire ground to a fine point; the dry point, a similar instrument, but with a more delicate point, and the burin or engraver. The latter, the principal tool of the engraver, is a small instrument of tempered steel, with one end ground off obliquely so as to produce a sharp cutting point varying in form from a lozenge to a square. The scraper takes off the burr raised on the metal by the cutting tools and softens lines engraved too deep, or polishes the plate when scratched.

In painters' etching a copper plate is used, covered with a film composed of asphaltum and wax. This ground is blackened with lampblack mixed with the varnish. The engraver then makes his drawing with etching needles, cutting through the ground to the plate. A border or bank of wax is then raised around the plate, and diluted nitric acid is poured over it. The etching ground resists the action of the acid, which corrodes only the parts uncovered by the needles. The invention of etching is attributed to Albrecht Dürer. Etching is employed largely for producing ornamental designs on glass. The method is the same as in etching on copper, but the acid used is hydrofluoric, generated in a leaden vessel over which the prepared glass is placed.

Engravers' etching is engraving executed with the tracing point instead of the burin, and bitten in with acid. A portion of every composite steel engraving is etched. An engraver's etching differs from a painter's in that the work is only preliminary to that of the burin. The highest grade of line engraving is executed with the burin or graver directly on the metal; delicate lines are put in with the dry point.

Stipple engraving is executed in dots instead of lines, and is much employed in portraiture and in engravings of sculpture; it is sometimes called chalk engraving. A mezzotint engraving resembles a drawing washed in with the brush; the plate is prepared by running over it a toothed instrument called a cradle, which raises a burr all over its surface. The lights and shades of the engraving are then produced by rubbing away, with scraper and burnishers, the parts where lights are desired, and by increasing the indentations for deeper shades. A pure mezzotint engraving is seldom produced, the process being usually combined with line and stipple. This style of engraving is supposed to have had its origin abt. 1640. Aquatint engraving is a species of etching, so called from the similarity of its effect to a drawing in India ink or bister. It has been superseded by lithography and chromolithog-

raphy. Dry-point work is done with a sharp-pointed tool, but without acid.

In the nineteenth century the discovery by Jacob Perkins, of Newburyport, Mass., of a process for decarbonizing steel made steel-plate engraving possible. Perkins's transferring process effected a still greater revolution. The softened plate when finished is reconverted into steel, and a decarbonized cylinder large enough to receive the impression is then rolled over it until the engraved impression appears on it in relief. The cylinder is then hardened, after which it can be used for returning the impression to softened plates, each of which will be an exact counterpart of the engraved plate. The original thus serves only to give one impression to the transfer roller, which in turn is used to make any number of plates. The most important application of this process is for engraving bank notes. The plates of notes are transferred usually in parts, a single vignette or figure at a time. See PHOTO-ENGRAVING.

Enharmon'ic, in music, one of the three genera (chromatic, diatonic, and enharmonic) of ancient music. The enharmonic genus of the Greeks was distinguished by the use of small intervals or quarter tones. In modern music, intervals much less than a semitone owe their origin to the slight difference of pitch which the same (nominal) note takes according as it is adjusted to one or another fundamental note or tonic.

E'nid, county seat Garfield Co., Okla.; 46 m. NNW. of Guthrie, on Skeleton Creek. Pop. (1906) abt. 15,270.

Enig'ma, an obscure question; a riddle; a proposition put in obscure or ambiguous terms to puzzle or exercise the ingenuity in discovering its meaning. Formerly it was deemed a matter of such importance that Eastern monarchs sometimes sent embassies for the solution of enigmas. Among the famous enigmas of antiquity were that which Samson proposed to the Philistines and that which the Sphinx propounded to Œdipus.

Enkhuizen (ĕnk-hoi'zĕn), fortified seaport of the Netherlands; province of N. Holland; on the Zuyder Zee; 30 m. NE. of Amsterdam; has a fine townhall, a cannon foundry, and shipyards; founded 1200, and sometimes called Enchusa; its town house, built 1588, and the Westerker are the most remarkable buildings. Pop. (1899) 7,038.

En'na, ancient city of Sicily; near the center of the island, on a lofty hill, almost inaccessible, except at a few points; was a place of great importance; site now occupied by the decayed town of Castro Giovanni. Enna was a seat of the worship of Demeter, and the shore of a small lake near by was the scene of the mythical rape of Persephone, a favorite subject with poets and artists.

Enniskill'en, municipal borough of Ireland; capital of Co. Fermanagh; on the Erne, 89 m. NW. of Dublin; principally engaged in the manufacture of cutlery and straw hats; supported the Protestant cause in 1689, when the troops of William III defeated here those of James II; gave its name to a famous British regiment originally formed from its defenders.

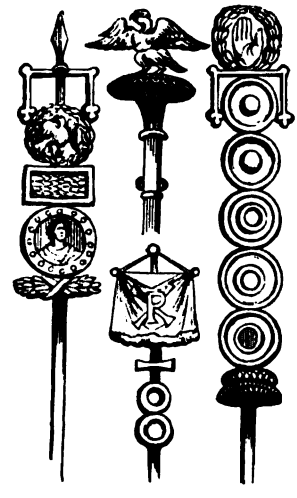
En'nius, Quintus, abt. 239–169 B.C.; "Father of Latin Poetry"; b. Rudiæ, S. Italy; wrote tragedies and comedies, and adapted the masterpieces of Æschylus, Sophocles, and Euripides to the Roman stage; principal work, "Annales," poem on Roman history from Romulus to his own time.

Enns, town and river of Austria. The town is situated on the Danube, near the mouth of the river Enns; 96 m. W. of Vienna; has manufactures of iron, steel, and cotton; was the headquarters of Napoleon, 1809. Pop. commune (1900) 4,371. The river rises in the crown land of Salzburg, 12 m. S. of Radstadt; flows through Styria; forms the boundary between Upper and Lower Austria; enters the Danube 11 m. below Lintz; length, 190 m., only the last 20 of which are navigable.

E'noch, name of five persons mentioned in the sacred books (canonical and apocryphal) of the Hebrews. The second in the order of time, and the most important, was "the seventh from Adam," who "prophesied," and was translated at the age of 365 (Gen. v, 23).

Enos (ā'nŏs), seaport of European Turkey; on the Ægean Sea, at the mouth of the Maritza; 80 m. S. by W. from Adrianople, of which it was the port before the completion of the railway from Adrianople to Dede-Agatch. Ænos is mentioned in the "Iliad," Book IV.

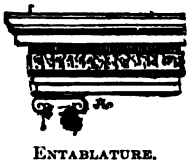
En'sign, (1) the first grade attained in the U. S. navy by midshipmen after a two-year's sea cruise and a satisfactory passing of an examination. The grade may also be attained by certain warrant officers. (2) Ensign was also formerly the name applied to the junior officer who carried the colors of the regiment. (3) The national flag borne by a ship is called its ensign, and in some nations these are of different kinds, *e.g.*, a British warship carries white, while colonial vessels carry blue, and red is borne by the merchant marine. In ancient times an ensign was a military standard consisting of an upright staff surmounted by a device peculiar to the nation or monarch to whom the ensign belonged.



TYPICAL ROMAN ENSIGNS.

Ensilage (ĕn'sĭ-lāj), a method of preserving forage plants in a green state; introduced into

the E. U. S. from France abt. 1875. The term is also applied to the fodder thus preserved. It has become very common in the dairy districts of the U. S. Silos may be built of wood, grout, or stone, either above ground or, better, below ground. Rectangular silos are the most common, but circular ones are the best. A silo should be deep, strong, durable, air-tight, and inexpensive, as the material to be preserved is bulky in proportion to its value. The methods of construction and filling silos in the U. S., as also the material ensilaged and the treatment after filling, vary. Some empty the silo from the top, others cut down and feed out a section at a time. Some ensilage the material when it is very immature, others when it is nearly ripe; some fill rapidly to prevent heating, while others fill slowly, so that the material may rise to 120° F.; some solidify while filling; some weight with stones, earth, or other material after a covering has been laid on; others simply cover with green weeds, grass, or straw, 1 to 2 ft. deep. The perfect silo is one which is absolutely air-tight, and from which all air is extracted after the pit is filled. Many kinds of plants have been ensilaged with greater or less success, but Indian corn is now used most largely. The best ears are often removed and dried, for, if the crop is good, the ensilage will be too rich in grain for most economical results in the dairy, if all the ears are ensilaged.



ENTABLATURE.

Entab'lature, in architecture of Greek, Roman, and revived classical styles, the portion of a building resting on the columns; consists of architrave, frieze, and cornice. In ordinary building the term is applied to the course of masonry on a wall immediately below the roof.

Entail', in law, an estate in fee limited to certain classes of descendants. Thus a fee simple would be regularly created by the word "heirs," as, for example, to "A and his heirs," and would descend to any heirs, however remote. An estate given to A and "the heirs of his body" would be confined to descendants. The descent might be still more strictly confined, as to male issue or the issue born of some specified mother. The peculiar features of an entail depend on an English statute termed "De donis," the effect of which was to confine the property to the specified mode of descent.



En'tasis, in architecture, a delicate and hardly perceptible swelling out in the taper of the shaft of a column, common in ancient Greece. It was adopted to prevent the shafts being strictly frusta of cones, in which case, by a simple optical law, the eye would get an incorrect impression as to the proportions of the column. It was one of the most delicate yet important of the refinements of Greek architecture, and has not been accurately attained in modern imitations.

Entel'echy, metaphysical term from the Aristotelian philosophy, denoting the fundamental idea of the whole system. Cicero defined this idea as "energy," but the Greek philosophers ridiculed him for the definition, and gave "perfection" as the constituent element of the idea. Melanchthon, however, and Leibnitz, and modern philosophers almost without exception, follow Cicero.

Entel'lus Mon'key, or Han'uman, species of E. Indian monkey about 2 ft. in length, having long limbs and a very long and powerful but not prehensile tail. These monkeys are regarded as sacred by the Hindoos, who dedicate temples to them, and erect hospitals for their benefit. The entellus monkeys exhibit a familiarity bordering on impudence, and often plunder gardens with impunity, as the Hindoos feel honored when robbed by them.

Enter'ic Fever. See TYPHOID FEVER.

Entomol'ogy, that branch of natural history which treats of insects, one of the classes of articulated animals. The term insect refers to the fact that in the animals indicated by it the body is divided by transverse incisions into a series of segments. This insected form of the body is characteristic of the entire branch *Arthropoda* and of the worms as well, but the term insect has become restricted to a portion of this great series of animals. There is, however, a lack of uniformity in the use of the term among zoölogical writers. By some it is applied to all *Arthropoda* that breathe by means of a system of air tubes (trachea) extending through the body. Other writers include among insects only those orders that are characterized by the possession of but six legs. As thus restricted insects constitute the class *Hexapoda.*



FIGURE OF AN INSECT, SHOWING THE GROUPING OF THE SEGMENTS INTO HEAD, THORAX, AND ABDOMEN.

Aristotle separated insects from crustacea, and divided them into winged and wingless, subdividing these last into several natural minor groups. Swammerdam, in the middle of the seventeenth century, made the first attempt toward a classification. Linnæus, in his "Systema Naturæ," 1735, divided insects into seven orders and the three classes, insects with four wings, insects with two wings, and insects with neither wings nor elytra. Agassiz adopted the seven orders of Linnæus, but subdivided insects into two classes, chewing and sucking.

One of the latest classifications is that by Prof. J. H. Comstock, who, restricting insects

to the class *Hexapoda*, expands the seven orders to nineteen, as follows, the first column showing the former classification and the second his enlargement:

Neuroptera.	1. Thysanura.
	2. Ephemerida.
	3. Odonata.
	4. Plecoptera.
	5. Isoptera.
	6. Corrodentia.
	7. Mallophaga.
	12. Neuroptera.
	13. Mecoptera.
	14. Trichoptera.
Orthoptera.	8. Euplexoptera.
	9. Orthoptera.
Hemiptera.	10. Physopoda.
	11. Hemiptera.
Lepidoptera.	15. Lepidoptera.
Diptera.	16. Diptera.
	17. Siphonaptera.
Coleoptera.	18. Coleoptera.
Hymenoptera.	19. Hymenoptera.

Here the *Thysanura* includes the bristletails, springtails, and fish moths; *Ephemerida*, the May flies; *Odonata*, the dragon flies, darning needles, spindles, and doctors; *Plecoptera*, the stone flies; *Isoptera*, the white ants; *Corrodentia*, the book lice and plant lice; *Mallophaga*, the bird lice; *Orthoptera*, the cockroaches, locusts, grasshoppers, katydids, crickets, walking sticks, and praying mantis; *Physopoda*, the thrips; *Hemiptera*, with three suborders; *Heteroptera*, the squash bug, chinch bug, and other agricultural pests; *Parasita*, the lice of man and other mammals, and *Homoptera*, the cicadas, aphids, and scale bugs; *Neuroptera*, the hellgrammite fly, aphis lions, and ant-lions; *Mecoptera*, the scorpion flies; *Trichoptera*, the caddice flies; *Lepidoptera*, moths, army worm, cotton worm, silkworm, and butterflies; *Diptera*, flies with a single pair of wings—mosquito, botfly, gadfly, gall gnats, etc.; *Siphonaptera*, the fleas and jigger of tropical America; *Coleoptera*, beetles; and *Hymenoptera*, bees, wasps, ants, and gallflies.

Entomophaga (ĕn-tō-mŏf'ă-gă), term applied by different zoölogists to groups of very diverse insect-eating animals. The name was given by Owen, 1839, to a division of *Marsupialia* containing the bandicoots and opossums, by Huxley to a group of the *Edentata*, comprising the ant-eaters, pangolins, and aard-varks, and by Woodward to a division of *Hymenoptera*, including insectivorous or parasitic forms such as the ichneumons, *Chalcididæ*, and others. It is also used for the small insectivorous bats or *Microcheiroptera*, as distinguished from the large fruit-eating bats, the *Megacheiroptera* or *Frugivora*.

Entomostraca (ĕn-tō-mŏs'tră-kă), lowest subclass of *Crustacea*. The body consists of a variable number of segments, those of the hinder portion being frequently without appendages. All pass through a metamorphosis, a nauplius larva escaping from the egg, and this usually transforms into a cyclopslike or cyprislike form. Most of the species are small, and many become extremely modified by parasitism. All are aquatic, and as they are enormously abundant they form a very important food of fishes. They are divided into five orders, *Phyllopoda*, *Cladocera*, *Ostracoda*, *Copepoda*, and *Cirripedia*.

Entozo'a, name formerly used for various parasitic animals usually grouped together as worms, but having in common no character other than the fact that they live within the bodies of other animals. The important ones belong to the *Vermes* (true worms), the lowest form of articulate animals. They are divided into (1) cestoid worms, or tapeworms, which are all more or less jointed, of a ribbonlike form, and dwelling in the intestines. (2) The flukes or trematode worms, of flat, oval form, smooth, soft, and not jointed. The disease called rot in sheep is caused by their presence in the biliary passages. In man they inhabit the liver, kidneys, lungs, etc. (3) The nematodes or round worms, having long, cylindroid forms. This class includes pinworms, *Ascarides*, the *Trichina*, the guinea worm, and many others. Besides the *Vermes* there are innumerable lower forms of organisms sometimes infesting the alimentary tract.

Entrecasteaux (ŏñtr-käs-tō'), **Joseph Antoine Bruni d'**, 1739–93; French navigator; b. Aix; entered the naval service, 1754; became commandant of the French fleet in the E. Indies, 1785, and Governor of Mauritius and the Isle of Bourbon, 1787; was sent in search of La Pérouse, 1791, and, though unsuccessful in this, traced the outlines of the E. coast of New Caledonia, the W. and SW. coast of New Holland, Tasmania, and various other coasts. His name is perpetuated in the d'Entrecasteaux Archipelago, in d'Entrecasteaux Point on the SW. coast of W. Australia, and in d'Entrecasteaux Channel between Tasmania and Bruni Island.

Envi'ronment, a term first used in zoölogy and botany, especially by the evolutionists to describe the sum of all the conditions or surroundings of an animal or plant which may influence its growth or manner of life. Indeed, with heredity it covers all factors of organic life. Climate, the physical features of the country, absence or presence of enemies and means of protection against them, the interdependence of organisms, such as insects and flowers, and the ease or difficulty in procuring food are among the more important factors of environment. In relation to man and society, environment has been taken by some writers as having a predominating influence upon character and natural life. Indeed, social traditions and observances have the strongest molding influence upon those subjected to them, and may be so deeply instilled that death will often be preferred to a violation of the traditional code of life.

En'voy, messenger; in political matters, a person deputed by a ruler or government for transacting business with a foreign ruler or government. In diplomacy the term envoy extraordinary and minister plenipotentiary is applied to a diplomatic agent of rank next below an ambassador.

Enzina (ĕn-thē'nă), **Juan del.** See Encina.

En'zio, or En'tius, 1225–72; natural son of Frederick II, Emperor of Germany; created by his father nominal King of Sardinia, and made Governor General of Lombardy and commander of the German troops against the Milanese; conquered many towns in Umbria. As commander of the emperor's naval force he defeated, in conjunction with the Pisan fleet, the Genoese in the vicinity of Leghorn, taking 4,000 prisoners and immense booty, 1241; captured by the Bolognese, 1249, and imprisoned till his death, twenty-three years.

Enzymes (ĕn'zīms), compounds found in animal and vegetable bodies which have the property of decomposing carbon compounds brought in contact with them, producing a change known as fermentation. They are numerous, and the action of some of them is not fully understood. They are classified as (1) organized enzymes, or the product of microörganisms, such as the yeast plant, and (2) unorganized enzymes, such as pepsinogen, lipase, and the milk-curdling zymogen which are produced by the stomach cells. The decomposing power of the enzymes is due to their power to abstract water from the carbon compounds they attack. Among the best-known enzymes are rennet, which coagulates milk; trypsin, which converts proteids into peptones, and the vegetable enzymes, papain and taka-diastase.

Eocene (ē'ō-sēn), the lowest division or earliest epoch of the tertiary formation or period. Its abundant fossils all belong to extinct species, although it was named (by Lyell) under the belief that it contained the earliest examples of living species, more fully represented in the Miocene and Pliocene. The Eocene rocks are well developed in the London and Paris basins. The formation extends along a great portion of the SE. coast of the U. S., principally in Maryland, Virginia, the Carolinas, and the Gulf States. In the Eocene formation of the Rocky Mountains, Professor Marsh, of Yale, found remains of ancient species of the horse having compound hoofs or separate toes. See EOHIPPUS.

Eohip'pus, extinct genus of the horse family occurring in the Lower Eocene deposits, and allied to *Orohippus* (see HORSE), but of a less specialized form, and apparently in the direct ancestral line. The feet had four toes in front and three behind, with a rudiment of the outer or fifth metatarsal, and may have had a rudiment of the first toe in the fore foot. This genus is represented by species from the lowest Eocene beds of New Mexico and Wyoming.

Eo'lian Harp. See ÆOLIAN HARP.

E'olus, in Roman mythology, the god of the winds.

Éon de Beaumont (ā-ōṅ' dė bō-mōṅ), **Charles Geneviève Louis Auguste André Timothée d'** (best known as CHEVALIER D'ÉON), 1728–1810; French diplomatist; b. Tonnerre. His feminine appearance and accomplishments enabled him to succeed in diplomacy as envoy to Russia, where he assumed female attire and became reader to Empress Elizabeth. He also acted as envoy in Vienna, and, after serving in the Seven Years' War, in London. A lawsuit resulting from a wager that he was a woman was decided by adjudging him to be one. On the death of Louis XV, the French ministry recalled him, through fear that he might betray their secrets to the British Govt., which offered him tempting inducements, and Louis XVI forced him to wear female attire, which he retained till his death. A *post-mortem* examination proved that he was a man.

E'on (or **Eu'do**) **de Stel'la,** fanatic of the twelfth century; an ignorant (and perhaps insane) nobleman of Bretagne, who, having heard, during the act of exorcism, the words "through Him" (*per Eum*, etc., in Latin) "who will come to judge the quick and dead," concluded, from the resemblance between his own name *Eon* and the Latin *Eum*, that he was the one appointed as the final judge of mankind. He taught a reformed doctrine, and gained many disciples. He was captured in 1148, and many of his followers (called Eonians) were burned, but Eon was pronounced insane, and seems to have been spared.

E'os, Greek name of AURORA (*q.v.*).

Eozoön (ē-ō-zō'ŏn), name given to certain gigantic forms found in the Laurentian rocks of Canada, Massachusetts, and other primordial regions, under the belief that they are fossils of the earliest animal organisms; other geologists believe these forms to be inorganic.

E'pact, word which now denotes generally the number of days between the last new moon of a year and the first day of the next year. Epacts are used to determine Easter Sunday, on which the dates of all the other changeable feasts of the Church depend.

Epaminondas (ē-păm-ĭ-nŏn'dăs), abt. 418–362 B.C.; Greek statesman and general; b. Thebes; commanded at Leuctra, 371, the Theban forces, which completely defeated the Spartans through new tactics devised by him; four times successfully invaded the Peloponnesus; ravaged Laconia, and freed Messenia, Sicyon, and Pellene from the Spartan yoke; founded Megalopolis in Arcadia; and commanded the Thebans who defeated the Spartans at Mantineia, but was killed in that action. Cicero declared that Epaminondas was the greatest man that Greece had produced, and historians consider him one of the greatest captains of antiquity; he appears to have been, like Gen. U. S. Grant, a "silent leader."

Epanomeria (ā-pă-nō-mā-rē'ā), remarkable town built on the face and edge of a tall cliff at the extremity of a promontory on the NW. end of the Island of Santorin, Grecian Archipelago. The houses, many of which are excavated from the rock, are one above another, fifteen or twenty deep, the lowest being 400 ft. above the water. They are approached by a winding road and staircase cut in the cliff.

Ep'aphus, son of Jupiter and Io, who caused Phaëton's destruction by denying his divine descent.

Ep'arch, in ancient Greece, the title of the governor of a province, a ship's master, a satrap, or the prefect of a region under the Roman rule. The province itself was called an eparchy. In modern Greece the primary subdivision of a nomarchy is called an eparchy. In Russia an eparchy is the diocese or archdiocese of a bishop or archbishop of the Greek Church.

Épée (ā-pā'), **Charles Michel de l',** 1712–89; French philanthropist; b. Versailles; became canon at Troyes, but was suspended from the priesthood as a Jansenist; while endeavoring to teach two deaf and dumb sisters, he first systematically used natural signs and gestures; established a school on the new principle of instruction, 1755, and sustained it at his own expense till his death, admitting poor children only and refusing compensation; published a book on the education of the deaf and dumb, 1774.

Epei'rus. See EPIRUS.

Eperies (ā-pā-rē-ĕsh'), or **Preso'va,** old town of Hungary; capital of county of Saros; on the Tarcza; 148 m. NE. of Budapest; surrounded by walls; one of the most beautiful towns of Upper Hungary; is a bishop's see; has a college, and manufactures of linens, woolens, and earthenware. A royal salt mine is worked in the vicinity. Gen. Caraffa established here, 1687, the famous bloody tribunal, which caused the torturing and execution of large numbers of patriots, especially Protestants.

Ephah (ē'fä), Hebrew measure; as liquid measure, contained about 7½ gals.; as dry, about 1½ bu.

Ephem'eral Fe'ver. See FEBRICULA.

Ephem'eris, in astronomy, a table giving the positions of any heavenly body for a considerable period, as an ephemeris of the fixed stars, showing the place of the principal stars for every tenth day of the year, and an ephemeris of the planets giving the position of each planet, usually for noon or midnight of every day, sometimes also for every transit over the meridian of some one place. An astronomical ephemeris is a collection of such ephemerides for a particular year or series of years, with the times of eclipses, occultations, and other astronomical phenomena, or the means of determining them. The more complete works of this kind are intended to furnish the astronomical observer with all the data he needs relating to the sun, moon, planets, and some of the principal fixed stars. From the adaptation of some portions of them to the wants of navigators, they are also called nautical almanacs.

Ephe'sians, The Epis'tle of St. Paul to the, one of the books of the New Testament; written probably in the year 61 or 62, during the apostle's first imprisonment at Rome, and about the same time with the Epistle to the Colossians. The words "at Ephesus" (i, 1), are wanting in some MSS., but the weight of evidence preponderates in their favor. The absence of personal greetings is easily explained by its encyclical character. It is one of the richest and most glowing of the Pauline Epistles. The first three chapters are doctrinal; the last three, hortatory and practical.

Eph'esus, one of the twelve cities of the Ionian confederation; on the river Cayster, which falls into the Gulf of Scala Nova on the W. coast of Asia Minor. Its earliest traditions connect it with the birthplace of Diana, who was worshiped here as the personification of the reproductive and nutritive powers of nature. Herodotus states that Hercules founded a city in the Ephesian territory, 1250 B.C. Androclus the Athenian, 1044 B.C., drove out the inhabitants, and with his followers established a Greek colony. Ephesus increased in importance with the cult of Diana, thus attracting multitudes from all parts, who both worshiped at the shrine of the goddess and profited by the commerce of the city; in this way it became the chief mart and the metropolis of Asia Minor. It was in turn ruled by tyrants, by oligarchies, and as a republic; paid tribute to Persia for two centuries from the time of Cyrus to Darius III. The Romans finally took this and other cities in Asia Minor, 41 B.C., and under Cæsar Augustus and the succeeding emperors the city was rebuilt. It was sacked by the Goths, 262 A.D., and from that time the city declined. For many centuries it was in the hands of various adventurers, and it had declined into a mere suburb when the Turks built a considerable town at Ayasalouk toward the end of the thirteenth century.

The most notable structure of the old city, its magnificent temple dedicated to Diana, was burned by Eratostratus, 356 B.C., rebuilt in and again destroyed by the Goths, 262.

Ephialtes (ĕf-ī-ăl'tēz), name of a famous giant in Greek mythology, a son of Neptune.

Ephod (ĕf'ŏd), Jewish robe or tunic worn originally by the high priest (Ex. xxviii, 4); afterwards by all priests (I Sam. xxii, 18). It was made of fine linen. The ephod of the high priest had a breastplate attached to it containing twelve precious stones, on which were engraved the names of the twelve tribes.

Ephori (ĕf'ŏr-ī), or **Eph'ors,** title of magistrates common to many of the Dorian states of ancient Greece. In the political constitution of Sparta the ephors exercised supreme power; they were five in number, and were elected from the ruling caste, for the term of one year. Besides their judicial authority, they controlled the functions of the kings and the senate, and sometimes recalled the former from their foreign expeditions. They negotiated treaties and possessed nearly all the executive power. The office was abolished by Cleomenes III, who came to the throne 236 B.C., but restored by the Romans.

E'phraim ("double fruitfulness"), one of the Hebrew patriarchs, second son of Joseph, and the head or founder of one of the twelve tribes of Israel. The territory of the tribe of Ephraim extended from the Jordan to the Mediterranean, and was bounded on the N. by Ma-

nasseh and on the S. by Benjamin and Dan; and was about 55 m. from E. to W. by 70 from N. to S.

Ep'ic Po'etry, or The Ep'os, poetry which narrates a series of adventures or events, usually of an heroic or supernatural order. Under this name are included poems of very different characters. Among great epics are the "Iliad" and "Odyssey" of Homer; the "Æneid" of Vergil; the "Mahâbhârata," one of the two great epics of India; the "Shah-Namah" of Firdausi; the "Chanson de Roland," ascribed to the Norman Théroulde; the "Gerusalemme Liberata" of Tasso; the "Orlando Furioso" of Ariosto; the "Lusiad" of Camoens; the "Paradise Lost" of Milton, and the "Messias" of Klopstock.

Epictetus (ĕp-ĭk-tē'tŭs), b. abt. 60 A.D.; Roman stoic philosopher; b. Hierapolis, Phrygia; a slave of Epaphroditus in his youth; became a freedman; was banished with other philosophers from Rome by Domitian, 89 A.D.; afterwards lived in Nicopolis, Epirus, where he conducted a school of philosophy. He esteemed philosophy to be but the love and practice of virtue. Recognizing only will and reason, his highest conception of life was being passionless under all circumstances. His teachings are summed up in the formula, "Bear and forbear."

Epicu'rus, 342–270 B.C.; Greek philosopher; b. Samos; established a school at Athens in his thirtieth year. With his pupils he constituted a community which has always been considered a model. The term "Epicureanism" has become almost a synonym for refined voluptuousness, but nothing was further from his doctrines. It is true that he taught *eudaimonia* to be the highest end and purpose of human life, but his word was intended to designate a state of supreme mental bliss, to be attained only by temperance, chastity, and a healthy intellectual development. That bliss, consisting in a perfect repose of mind, in an equilibrium of all mental faculties and passions, is perhaps not very different from the state which the Stoics considered the acme of human perfection, although they were the most unrelenting adversaries of Epicureanism. Epicurus was a man of unsullied morality. Diogenes Laërtius estimates the number of his works at 300 or more.

Epicycle (ĕp'ĭ-sī-k'l), in ancient astronomy, a circle having its center moving along the circumference of another circle, called the deferent. It was the opinion of the Greek astronomers that all the celestial motions must be uniform and circular, because the circle is the most perfect of plane figures. The phenomena of the stations and retrogradations of the planets were apparently inconsistent with this notion; and in order to explain them, Apollonius of Perga imagined the theory of epicycles and deferents.

Epicy'cloid, curve traced by a point on the circumference of a circle which rolls on the convex side of a given fixed circle. It belongs to the class of curves called roulettes, and is not invariably a transcendental curve. The epicycloid was invented by Romer, the Danish astronomer, who abt. 1674 proposed it as the best form for the teeth of wheels, in order to prevent friction.

Epidau'rus, ancient town of Greece; on the E. coast of the Peloponnesus and on the Saronic Gulf; 45 m. SW. of Athens; derived much of its importance from its Temple of Æsculapius (5 m. from the town), one of the most celebrated sanctuaries in Greece, and frequented by patients from all the Hellenic states seeking a cure. Here are the ruins of a magnificent theater, 370 ft. in diameter, with fifty-five rows of seats. Once in four years, nine days after the isthmian games at Corinth, a festival was celebrated here in honor of Æsculapius, with musical and gymnastic games. On or near the site of Epidaurus is a small village called Pidavro, at which the first national assembly of modern Greece assembled, 1822, and drew up the Constitution of Epidaurus.

Epidem'ic, term applied to a disease which appears in a certain locality and spreads widely. If the number affected is very great it is called a pandemic disease. An endemic disease, on the other hand, is one constantly met with, isolated cases occurring now and then. Many epidemic diseases are endemic in certain countries where the conditions are favorable, as cholera, which is endemic on the deltas of the Ganges, and yellow fever, which is constantly present in certain of the S. American states. Certain diseases which are endemic as a rule, become epidemic when atmospheric or other influences predispose the community to general infection. This is seen in the U. S. in typhoid and dysentery, as well as other diseases. Formerly atmospheric and telluric conditions, such as humidity, winds, the character of the soil, soil moisture, and the like, were given the most prominent place in the causation of epidemics; but they are now regarded as of secondary importance to the actual causes, microörganisms.

The study of epidemiology is therefore intimately concerned with that of bacteriology and preventive medicine, and a knowledge of the causes of epidemics has led to almost complete eradication of certain diseases. Diseases which are epidemic are for the most part of the group designated as infectious. Of these diseases, some, as typhoid fever, diphtheria, and scarlet fever, are also included among the contagious diseases, *i.e.*, they are communicated by mere contact, while others, as cholera, and malaria, are noncontagious, and are never communicated directly from person to person, excepting through water, food, or other matters infected by the affected individual. Exact lines cannot be drawn between noncontagious and contagious diseases, and in the case of certain diseases there is doubt as to the class to which they belong. See PLAGUE.

Epider'mis, Cu'ticle, or Scarf'skin, a modification of the epithelium, accurately molded to the papillary layer of the true skin or derma. When exposed to pressure and friction it be-

comes hard and thick, as in the palms of the hands; otherwise it is soft. It is composed of agglutinated, flattened cells, but in the deep layers the cells are rounded or cuboidal. In most races these deep cells contain pigmentary matter, which gives the skin its various shades, from black to white. The epidermis is penetrated by the ducts of the sweat glands and oil glands of the skin. Its cells are developed by multiplication of the cuboidal cells of the deeper layers. The hair and nails in man, and also the horns in lower animals, are modifications of the epidermis. See SKIN.

Ep'idote, mineral consisting essentially of silica and alumina, combined with portions of lime, oxide of iron, or peroxide of manganese. Some of the clear varieties are used as gems; these are chiefly from Untersulzbachthal, in the Tyrol. Epidote occurs in the crystalline rocks of the E. U. S. at many places, but not of gem quality. A variety containing lime is called zoisite, and another containing manganese is termed pistacite. The color is generally some shade of olive color, from nearly black to golden green, yellow, brown, or red.

Epigæa (ĕp-ĭ-jē'ă), genus of plants belonging to the heath family, and including the trailing arbutus, a prostrate plant with evergreen and heart-shaped alternate leaves and clusters of rose-colored or white flowers, which appear in early spring and exhale a delightful fragrance. It is found in sandy woods, especially under evergreens, sometimes in rocky soil, and ranges from Canada to Texas. In New England it is somewhat inappropriately called Mayflower, and in the South ground laurel.

Epiglottis (ĕp-ĭ-glŏt'tĭs), lid which closes the entrance to the larynx during swallowing; is composed of fibrocartilage covered with mucous membrane. During respiration the epiglottis is vertical, and in the act of swallowing it automatically falls backward and downward and closes the larynx, thus preventing the passage of food into that organ.

Epig'oni, collective appellation of the sons of the seven Greek chiefs who conducted the expedition against Thebes, Alcmaeon, Thersander, Diomedes, Ægialeus, Promachus, Euryalus, and Sthenelus. They renewed the war and took Thebes. Æschylus made them the subject of a tragedy, "The Seven against Thebes." In literature the epithet of "epigoni" is sometimes applied to those writers who confine themselves to the further development of the ideas of the great masters of the classic period.

Ep'igram, originally an inscription or brief writing; a short poem or piece of verse which has only one subject, and ends with a witty or ingenious turn of thought; an interesting idea expressed happily in a few words. The Greek epigram was at first a short collection of lines inscribed on a monument or statue, and the word was afterwards transferred to short poems suitable for inscriptions.

Ep'ilepsy, disease of the nervous system, in which there are occasional fits of complete loss of consciousness, usually associated with convulsions; sometimes called fits or falling sickness. Often a patient can foretell an attack by means of a local sensation called an aura, as a feeling of uneasiness at the pit of the stomach, or a feeling of terror, or a flash of light. The attack may last from two to twenty minutes, and is followed by exhaustion and sleep. In other cases, called *petit mal* (French for "little sickness"), the loss of consciousness is but momentary, and there is no convulsion or falling down, as in ordinary attacks. The seat of the disease is in the gray matter of the surface of the hemispheres of the brain. In Jacksonian epilepsy consciousness is not affected, and the spasm is localized to one limb or set of muscles, caused by a lesion in the motor area of the brain, as a tumor, abscess, or injury. But little is known of its causation. It is most apt to begin in childhood. Direct inheritance plays a smaller part than is popularly supposed, but insanity, drunkenness, and hysteria in the parents strongly predispose to it. Fright, overeating, worms, teething, are all said to be causative.

Notwithstanding the effects of this disease on the minds of many of its victims, not a few distinguished men have been epileptics, as were Cambyses, Cæsar, Mohammed, Petrarch, Henry IV of England, Napoleon, and Byron. The ancients, it is said, sometimes called this disease *morbus basilicus* ("kings' disease"), from the idea that great men were especially liable to it. The treatment during the paroxysm is simply to place the patient where he cannot hurt himself, to loosen his clothing, and give him plenty of fresh air. The best treatment is hygienic, coupled, if necessary, with the administration of nerve sedatives, such as the bromides. Between the paroxysms the patient should avoid all excesses of eating, of drinking, or of any other kind. Systematic exercise, and even gymnastics, never carried so far as to produce much weariness, are often beneficial. Nutritious food, with avoidance of coffee, tobacco, and stimulants, is usually advisable.

Ep'ilogue, in dramatic poetry, the closing address to the audience at the end of a play; usually spoken by one of the actors, and cheerful and familiar in tone. The term is sometimes applied to the conclusion of an oration.

Epimenides (ĕp-ĭ-mĕn'ĭ-dēs), Greek poet and prophet; native of Crete; lived abt. 600 B.C. According to tradition, he fell asleep in a cave, and awaked after a lapse of more than fifty years, with a large increase of wisdom and inspiration. A poem on the voyage of the Argonauts is ascribed to him. At the request of the Athenians, who were afflicted with the plague, he visited Athens, abt. 596 B.C., and purified that city. Goethe wrote a poem called "Des Epimenides Erwachen."

Epimetheus (ĕp-ĭ-mē'thē-ŭs), in Greek mythology, a brother of Prometheus and the husband of Pandora. His daughter Pyrrha became the wife of Deucalion.

Epiornis (ĕp-ĭ-ōr'nĭs), one of the gigantic ostrichlike birds of which the dinornis is the

type. It was a native of Madagascar, and became extinct probably since the historic period began, or at any rate since the appearance of man.

Epiphaneia (ĕp-I-fā-nē'ŭ). See HAMAH.

Epipha'nius, Saint, abt. 310–403 A.D.; a Father of the Church; b. Besanduke, Palestine; educated in Egypt by monks, who instilled into his mind ascetic notions; became a disciple of Hilarion; was made Bishop of Constantia (formerly Salamis), in Cyprus, 367. He was an adversary of Origen, whom he denounced as a heretic, and he coöperated with those who deposed Chrysostom. He wrote, besides other works, a treatise against heresies, entitled "Panarium," one of the most important sources of information for the history of the ancient Christian Church.

Epiph'any, festival in the Christian Church, celebrated the twelfth day after Christmas (January 6th), to commemorate four events: (1) Christ's baptism; (2) His birth; (3) His manifestation to the magi; (4) the manifestation of his divinity in the miracle at Cana. Later, especially in the Western Church, it popularly commemorated the visit of the three wise men to the infant Jesus. It was Eastern in its origin, and to-day in the Greek and other Oriental churches it is the season for baptisms and of the solemn blessing of the waters. The eve of Epiphany, called Twelfth Night in England and Three Kings' Night in Germany, was anciently a great popular festival, and is still celebrated.

Epiphyte (ĕp'I-fīt), plant which attaches itself to the bark of trees, and derives nourishment chiefly from the air, whence the popular name of air plant. Such plants are found generally in tropical countries, and prefer moist and shady situations. The orchideous epiphytes are cultivated with great success in greenhouses. Many of them are of exquisite beauty, and others are remarkable for their grotesque forms.

Epi'rus, or **Epei'rus,** country of ancient Greece; bounded E. by the chain of Pindus, S. by the Ambracian Gulf, and W. by the Ionian Sea; corresponds to the S. portion of modern Albania, a wild and mountainous region which in all ages has been occupied by semicivilized and robber tribes, called Epirots or Epirotes. It is adapted to pastoral pursuits, and its fine horses, oxen, and Molossian dogs were celebrated in antiquity. The three most important tribes of Epirots were the Chaones, Molossi, and Thesproti. The Molossi eventually became the masters of all Epirus. Among the Molossian kings was Alexander, whose sister Olympias was married to Philip of Macedon. The most celebrated king of Epirus was Pyrrhus, under whose reign this kingdom attained its greatest power and splendor. Epirus became a Roman province, 168 B.C., and was conquered by the Turks, 1466 A.D. The chief towns were Ambracia, Buthrotum, and Dodona. This region is still frequently called Epirus or "the Epirus."

Epis'copal Church, Prot'estant, ecclesiastical body in the U. S., which before the Revolution was part of the Church of England, but became an independent body in 1789. Before the Revolution the Church of England parishes, which had existed in the colonies from the settlement of the country, had all been under the nominal jurisdiction of the Bishop of London, who furnished them with no adequate oversight. There was also difficulty in procuring ordination, as the Church of England in the colonies had no bishop, and it was necessary to cross the Atlantic to procure ordination. The movement to constitute one Episcopal Church through the whole U. S. began at a convention held in the interests of the "Corporation for Relief of Widows and Orphans of the Clergy," held at New Brunswick, N. J., May 11, 1784, where the principles of a national ecclesiastical union of the churches in America were discussed. A convention in the same year, at which eight states were represented, further discussed the plans of separation from the Church of England, but not until 1789 were the constitution, enactments, and the necessary canons ratified, leaving the Protestant Episcopal Church fully organized. The Thirty-nine Articles of the mother church were adopted with summary alterations and omissions in the political article which the separation of Church and State made necessary. The only doctrinal difference is the omission of all allusion to the Athanasian Creed (Article VIII), which is also excluded from the American editions of the prayer book.

The Episcopal Church, while it receives the Holy Scripture as the ultimate rule of faith, does not throw them open to the varying interpretations of private judgment, but explains them by the aid of traditions which it believes to have come through an unbroken line of teachers from the apostles themselves, by the creeds, and by the definitions of Christian doctrine made by the general councils. Candidates for baptism are required to confess their faith in the words of the Apostles' Creed—adults in person, and infants by their sponsors. Communicants must receive also the Nicene Creed, which contains the same teachings in a more expanded form. Nothing is required from laymen, beyond acceptance of the prayer book and a proper deference to the instructions of the clergy, who are believed to derive their doctrine and their right to teach by a succession from the apostles. The Thirty-nine Articles of the Church of England (except the Twenty-first, "of the power of Christian princes in relation to general councils") are still bound up with the American prayer book—with a separate title-page, however—but the practice of signing them has been laid aside since the Revolution. The clergy sign, instead, a general declaration that they "believe the Holy Scriptures of the Old and New Testament to be the Word of God, and to contain all things necessary to salvation"; and they "solemnly engage to conform to the doctrines and worship of the Protestant Episcopal Church in the U. S."

A general convention, which meets triennially, legislates for the whole church, each diocese

being represented in convention by the bishops, four clergy and four laymen. There were (1908) 5,197 ministers, 7,779 churches, 830,659 communicants.

Episcopal Sys'tem, in the Roman Catholic Church, that theory according to which the highest clerical power is vested in the whole body of bishops. This theory was most prominently brought forward in the papal elections of the fourteenth century, and its followers declared the Church, as represented in its general assemblies, to be above the pope. In France the Univ. of Paris was the chief supporter of this theory, and the Gallican Church accepted it as one of its fundamental laws. The system also spread in Germany. But the declaration of papal infallibility has put an end to these differences, and made an impossibility of the episcopal system. In the German Protestant churches the episcopal system is that theory according to which the authority of the bishops, which had been suspended in the Protestant countries in consequence of the peace of 1555, was transferred to the ruler of the country.

Episco'pius (originally *Bischop*), **Simon,** 1583–1643; Dutch theologian; b. Amsterdam; Prof. of Theology Univ. of Leyden, 1612–18; then, accused of Socinianism, and banished by the Synod of Dort, he retired to France, but returned to Holland in 1626; became first Prof. of Theology in the newly established Remonstrant Seminary in Amsterdam, 1634. He was distinguished for his liberality, moderation, and other virtues, and was the chief pillar and champion of the Arminians or Remonstrants; chief works, "Confession of the Remonstrants" and "Institutes of Theology."

Ep'isode, originally, one of those parts of an ancient classical drama which were performed between the entrances of the chorus. In modern use it signifies an incidental story or a digression in a narrative, more or less connected with the main plot, but not essential to its development.

Epis'tates, title of the presidents of the two great councils of the ancient Athenians—*viz.*, the Ecclesia and the Senate of Five Hundred. Their term of office was one day.

Epistemol'ogy, science of knowledge; that department of metaphysics which treats of the origin and process of knowledge, having as specific problems the validity of knowledge, the nature of the soul, and its connection with the body.

Epis'tle, literally, a thing sent, hence a letter. The name is now given especially to the twenty-one epistles of the New Testament. The writings ascribed to the Apostolic Fathers (Clement of Rome, Barnabas, Ignatius, Polycarp, and Hermas) are for the most part epistolary in form. Of quite inferior dignity and value are the following spurious epistles: Abgarus of Edessa to Christ, and Christ to Abgarus; Lentulus to the Roman Senate; several of the Virgin Mary; Paul to the Laodiceans; the Third of Paul to the Corinthians, and one of the Corinthians to Paul; Peter to James; eight of Seneca the philosopher to Paul, and six of Paul to Seneca.

Epis'tolæ Obscuro'rum Viro'rum (Letters of Obscure Men), famous collection of satirical letters directed against the monks and the Roman Catholic Church. They were published in three parts: the first at Haguenau, 1515, the second at Basel, 1517, and a third at a later date. They were probably written jointly by Ulrich von Hutten, Crotus Rubianus, and Buschius. They are an admirable imitation of the barbarous Latinity of the monks of those days.

Ep'itaph, inscription on a monument over a grave commemorating the deceased. The oldest known epitaphs are on the Egyptian sarcophagi. Among the many perfect examples of Greek epitaphs is that for the dead at Thermopylæ—"Go, stranger, and tell Lacedæmon that we lie here in obedience to her laws." Epitaphs frequently consist of a request to the reader to keep the grave green and undisturbed. The simplest European inscriptions usually begin *Hic jacet* (Here lies), then give the name with dates of birth and death, followed by the initials "R. I. P." (*Requiescat in pace*—rest in peace). From time immemorial the epitaphs of the great ones of the earth have been written in the superlative. If epitaphs could be believed the finest flower of human achievement lies buried beneath them. But a truer note is sometimes found. "O rare Ben Jonson" is among the most simple and expressive inscriptions in Westminster Abbey, and Dr. Johnson's epitaph on Goldsmith: "He touched nothing which he did not adorn" has the double merit of neatness and truth. The visitor to St. Paul's Cathedral is struck by the epitaph over its architect, Wren, "If you seek his monument look around you." "Here lies one," says the inscription over the tomb of Keats, "whose name was writ in water"; but the poet's real epitaph is in Shelley's poem "Adonais."

Epithalamium (ĕp-ĭ-thă-lā'mĭ-ŭm), a bridal hymn; a chorus sung, in ancient Greece, near the door of the bridal chamber. It appears to have been a formal part of the marriage ceremony. The term is often given to formal poems composed in honor of a particular marriage. Anacreon and Pindar composed poems of this kind. The most perfect example of it now extant is the Latin "Epithalamium of Peleus and Thetis," by Catullus. The finest example in English is by E. Spenser.

Epithelium (ĕp-ĭ-thē'lē-ŭm), the layer of cells which line the mucous (or open) cavities of the body, the mucous epithelium being continuous with the epidermis, which is also a form of epithelium.

Epithelium is of various kinds, according to the shape of the cells, thus: squamous or flat cells, cylindrical cells, cuboidal cells, etc. A peculiar variety of cylindrical is the "ciliated epithelium," which is provided with fine hairlike processes (cilia), whose length varies from $\frac{1}{1000}$ to $\frac{1}{3000}$ of an inch. These cilia

have a rapid automatic motion in one direction, moving from 150 to 250 times in a minute. In some instances these motions obviously assist in discharging excretions, etc., but in others their use is unknown. The epithelial cells have an important part in the secretion of many fluids. For example, mucus is formed by the bursting of epithelial cells and the discharge of their soft contents, mingled with the débris of the old cell walls. This process of destruction is attended by continual renewal of the cells. See SKIN.

Epitome (ē-pĭt'ō-mē), in literature, an abridgment; a work in which the contents of a former work are reduced into a smaller space by curtailment and condensation. In the declining age of the W. Roman Empire the practice of epitomizing the works of older writers, especially in history, became very prevalent. Among the best-known works of this class are the epitome of Florus, "Epitome Rerum Romanarum," and that of Eutropius, "Breviarum Historiæ Romanæ," both abridgments of the history of Rome.

Epizo'a, name given to animals living on the skin and among the hairs of other animals, as fleas, lice, ticks, mites, etc. Some of these, like the itch mites, are *Acarina*—spiders of low grade of development, but most are insects of spider-like character, low forms of *Diptera* and *Hemiptera*. Most mammals, many birds, and



HEAD-LOUSE.



BIRD-MITE.



FLEA.

a great many insects are infested by insect parasites. The *Cyamus ceti*, or whale louse, living on whales and fishes, is a crustacean. Many *Cirripedia* live in a similar way upon whales and sharks. Most *Epizoa* live as true parasites on the blood and secretions of the animal which they infest. Others, especially the *Cirripedia*, appear to feed on other food, making the skin of a larger animal merely their place of abode. The great majority of *Epizoa* are articulate animals.

Epizoöt'ic, disease which attacks the lower animals, or any one species of them, as epidemics attack men. The so-called epizoötic diseases follow the general laws of epidemics, and they appear to attack especially the domesticated animals. Some diseases attack both man and the lower animals. Thus, smallpox affects the horse, cow, and sheep, assuming in each a modified form. Among the more important epizoötic diseases are the rinderpest, the contagious pleuropneumonia, and the "foot-and-mouth disease" (all attacking neat cattle); the remarkable influenza which attacked horses and mules, arising in Canada, September 30, 1872, and rapidly moving S. and W. over the whole of N. America; the scab, foot rot, and other diseases of sheep. The "reds," the *muscardine*, *pébrine*, and other diseases of the silkworm have been the cause of serious calamities to operatives, and at times have almost threatened the existence of the silk manufacture.

E Plu'ribus U'num (Latin, "one composed of many" or "one of many"), motto of the U. S. of America. After the declaration of their independence by the states was announced on July 4, 1776, and before the adjournment of that day's session, it was resolved, "That Dr. Franklin, Mr. J. Adams, and Mr. Jefferson be a committe to prepare a device for a seal for the U. S. of America." The result of their joint work was the present seal, which has not been changed since its first adoption. The six sections, or quarterings, on the escutcheon or shield were intended to denote the countries (England, Scotland, Ireland, France, Germany, and Holland) from which the states so united had been chiefly peopled. The motto on this seal was intended to denote the character of the Federal Govt. in its formation. From the six quarterings on the shield, with the necessary seven attending spaces outside of the sections or quarterings, arose the original thirteeen stripes, as they are called, which were transferred to the flag of the Union in 1777. The stars were intended to represent the number of the states.

Epode (ĕp'ōd), in ancient prosody, (1) the shorter, usually the second, verse of a couplet, as an iambic trimeter and dimeter; hence a poem consisting of such couplets, as the "Epodes" of Horace. Though the Elegiac Distich is epodic, elegies are not usually called epodes. (2) In Greek poetry, a lyric system, like a strophe, occurring after a pair of strophes (strophe and antistrophe), so that the three sometimes form a compound unit, called a *triad*. All the odes of Pindar, some lyric fragments, and some choric odes of the drama contain epodes.

Ep'ping, town of Essex, England; at the N. end of Epping Forest; 16 m. NNE. of London; noted for its cream, butter, and sausages. Epping Royal Forest, formerly Waltham Forest, covers 60,000 acres, but was once far more extensive, covering the whole of Essex almost to the gates of London; now only 13,000 acres are in woods and wastes, and the rest is inclosed as private property. It was formerly the seat of a famous fair held every year around Fairlop Oak, and of a stag hunt held on Easter Monday. In the midst of the forest Queen Elizabeth's hunting lodge is still standing. Pop. (1901) 3,789.

Ep'som, market town of Surrey, England; 14 m. SSW. of London; has mineral springs

containing sulphate of magnesia (Epsom salt). They were discovered in 1618, and for some time drew great numbers of visitors. Charles II and Prince Jörgen, of Denmark, the spouse of Queen Anne, often resorted to them. Gradually, however, they were deserted. Epsom has a royal medical college, and is famous for its horse races, held yearly on the Downs, 1½ m. S. of the town. The races last four days, one of which is called Derby Day, and are more numerously attended than any other races in the kingdom. They were permanently established in 1730. Pop. (1901) 19,915.

Epsom Salt, hydrated sulphate of magnesia, formerly obtained by evaporating the waters of the mineral springs at Epsom, England. It is made artificially by dissolving magnesite in sulphuric acid. This salt is used in medicine as a cooling, and generally safe, cathartic. The dose is from half an ounce to an ounce in a glass of water. In the household it is an excellent addition to starch, decidedly increasing its stiffening powers. Mixed with ordinary whitewash, it gives a fine pearly whiteness to walls.

Ep'worth League, voluntary organization composed of young people of the Methodist Episcopal Church, to promote piety in its members and their development along social, intellectual, and religious lines; formed at Cleveland, Ohio, 1889, at a convention of the representatives of five general young people's societies of the Methodist Episcopal Church. Its headquarters are at Chicago, where is published weekly *The Epworth Herald,* its official organ. The league was officially adopted and indorsed by the General Conference at Omaha, 1892. The Methodist Church of Canada and the Methodist Episcopal Church S. have adopted it.

Equa'tion, in algebra, a statement that two quantities having different algebraic expressions are equal. The equality is expressed by writing the sign = between the expressions asserted to be equal. Each of the equal expressions is called a member of the equation. Equations are of two general classes—identical and conditional. An identical equation is one in which the two expressions must be equal from their very nature or meaning; as, for example, $3 + 3 = 6$ and $(a + b)^2 - 2ab = a^2 + b^2$. In either of these equations the two members are equal because they express the same quantity in different ways, and so remain equal whatever values we assign to the quantities. Conditional equations are those in which the two expressions are not equal for all values of the quantities, but which imply certain relations between them. For example, if we have the equation $x + y = 6$, this equation is not true from the nature of the case, nor is it true for all values of x and y. It is true only on condition that the quantities x and y are so chosen that their sum shall be 6. It is because of this that such equations are called conditional.

An *exponential equation* is one which involves terms wherein the unknown quantity is an exponent or constituent of an exponent. The equation has many other imaginary roots, and is consequently transcendental. A curve in whose equation the coördinates appear as exponents is called an exponential curve. The logarithmic curve is an example. A *quadratic equation* is an equation of the second degree, containing but one unknown quantity. The following properties are common to all quadratic equations, after being reduced to the form (1): (1) Every quadratic has two roots and only two. (2) If all the terms are transposed to one member, that member can be resolved into two factors of the first degree with respect to the unknown quantity, the first term of each factor being the unknown quantity and the second terms being the two roots, each taken with a contrary sign. (3) The algebraic sum of the two roots is equal to the coefficient of the second term with its sign changed. (4) The product of the two roots is equal to the second member with its sign changed. (5) If the second term is negative, and numerically greater than the square of half the coefficient of the second term, both of the roots are imaginary.

Equation, Per'sonal, that constant which must be applied to every time observation recorded by an observer (as in astronomy) in order to make the mean of such observations agree with those of another observer. Different persons, in recording the results of observations, make various errors, some anticipating the event, but others failing to record it at the proper time. When it is found possible, by examining a long series of records made of the same events by two observers, to discover the average difference between their records of events, a very important correction of time intervals may sometimes be introduced into a computation based on such records. Such a correction is called the relative personal equation of the two astronomers. When it is found that an observer habitually makes, or is likely to make, a certain error in his time records, such error (or absolute personal equation) can be readily allowed for. By extension the term "personal equation" is used for the allowance which must be made for prejudice or mental limitations.

Equation of Time, difference in mean solar time between the sun's apparent or true right ascension and its mean right ascension; in other words, the difference between sun time and clock time. This difference arises: (1) from the sun's unequal motion in longitude because of the eccentricity of the earth's orbit; (2) from the obliquity of the ecliptic; and (3) to some small extent from the perturbations of the moon and planets. Sun time and clock time agree abt. December 25th, April 16th, June 16th, and September 1st. The equation of time is greatest abt. November 1st, when the clock is sixteen minutes and sixteen seconds faster than the sun. See TIME.

Equa'tor, in geography, a great circle of the terrestrial sphere, equidistant from the two poles, which divides the earth into N. and S. hemispheres. Latitudes are counted from the equator along the meridian, and longitudes are measured on the equator or on some circle parallel with it. EQUATOR, in astronomy, the

great circle of the celestial sphere, of which the plane is perpendicular to the axis of the earth's diurnal motion; so called because when the sun is in its plane the days and nights are exactly equal all over the world. The apparent diurnal motions of all the celestial bodies are performed in circles parallel to it. Right ascensions are measured on it.

Eques'trian Or'der, also called KNIGHTS, an important division of the citizens of ancient Rome; originally, the cavalry of the Roman army. According to Livy, Romulus constituted three centuries (300) of *equites* (horsemen), to whom he gave the names of Ramnenses, Titienses, and Luceres. Down to the year 123 B.C. the equites formed simply a division of the army, and their centuries were composed of patricians and plebeians, but C. Gracchus in that year procured the passage of the "Lex Sempronia," which instituted a new class or political order called *ordo equestris*, from whom all the *judices* (judges) must be selected. The reform of Sulla deprived them of the sole right of being chosen as judices, who thenceforth were selected from the senators, equites, and *tribuni ærarii*. The equites also enjoyed the privilege of officiating as *publicani* or farmers of the public revenue.

Equinoc'tial Points, two opposite points of the celestial sphere in which the ecliptic and equator intersect each other, the one being the first point of Aries, and the other the first point of Libra. These points do not retain a fixed position in relation to the stars, but retrograde from E. to W. with a slow motion, requiring 25,000 years to accomplish a complete revolution. This motion is called the Precession of the Equinoxes.

E'quinox, in astronomy, the time when the sun passes through the equator in one of the equinoctial points. When the sun is on the equator the days and nights are equal all over the world; hence the derivation of the term. This happens twice every year, *viz.*, abt. March 21st and September 22d; the former is called the vernal, and the latter the autumnal equinox. The equinoxes do not divide the year into portions of equal length, the interval from the vernal to the autumnal equinox being greater than that from the autumnal to the vernal; in other words, the sun continues longer on the N. than on the S. side of the equator, because it is more distant from the earth while on that side, and its angular motion in its orbit is consequently slower between March and September than in the other part of the year. See SOLSTICE.

Equisetaceæ (ē-kwĭ-sē-tā'sē-ē), family of cryptogamous plants, with hollow and jointed stems, growing in ditches, wet ground, and rivers in many parts of the world. They are related to the ferns and the extinct Calamites. They are found fossil in coal, and were in ancient geologic periods very much larger and more numerous than at present. This family is now the sole representative of the single surviving order (*Equisetaceæ*) of the class *Equisetinæ*, the lowest class of the great division of the vegetable kingdom known as the fernworts (*Pteridophyta*).

Equites (ĕk'wĭ-tēz). See EQUESTRIAN ORDER.

Eq'uity, a portion of English and American jurisprudence, usually distinguished from common law. The old technical actions at common law having been found inadequate except for the recovery of money or specific property, and the common-law judges having adopted strict and narrow rules, it became a practice to address petitions to the king in particular cases for relief which could not be obtained in those courts. The disposal of these petitions in course of time devolved upon the lord chancellor as the keeper of the king's conscience, and gradually the courts of chancery became a regular tribunal for the administration of justice. When English jurisprudence had assumed a precise and fixed character, there were thus two sets of tribunals—courts of common law and courts of equity. In some cases the jurisdiction of the two courts was concurrent; in others the equity court had exclusive authority. The courts differed in three respects: as to the mode of proof and of trial, and in respect to the nature of the relief granted. In the U. S. in many of the states, law and equity are administered by a single court and under the same system of pleading, but even in these states the difference in relief still continues. Equity jurisdiction attaches to the person of a litigant, without reference to the situation of the property in controversy. Thus the court of chancery in England might order a defendant within its jurisdiction to execute a conveyance of land situated in the U. S.

The principal heads of equity jurisdiction are: Cases of accident or mistake (as where a clause is omitted from an instrument by accident); cases of fraud, either actual or constructive; specific performance of contracts (*e.g.*, requiring a party who has promised to execute a conveyance to fulfill his contract); cases of interpleader, whereby a mere stakeholder can be relieved from the results of a litigation; cases of accounts, including a variety of instances; cases of trusts, whether created by express words or arising from implication of law. The court also protects all persons under actual or legal disability, such as infants, married women, and persons of unsound mind. Under these and other heads the court may cancel, modify, or reinstate instruments, and in general adjust the rights of the respective parties to the controversy. On some of these cases actions may be brought in a court of law. Thus in case of fraud, if the injured party desired pecuniary damages, he would bring his action at law; if he desired to set an instrument aside, he would proceed in equity. The most extensive of all equity topics is that of trusts. A court of equity is theoretically always in session, and an order, such as an injunction, may be issued by a judge having equity jurisdiction at any time. A "chancery suit" has become synonymous with interminable litigation, but it must be remembered that property, etc., may be kept "in chancery," or under the management of a trustee for many years, owing to the terms of the trust, the infancy of parties, etc., and that the comprehensive nature of an equity proceeding which permits all proper parties to inter-

vene and end in a decree covering the whole subject matter in dispute, is intrinsically different from a common-law trial of one particular issue of law or fact to be decided off hand by judge or jury. In many states the tendency is to blend common law with equity rules. But in the federal courts they are kept distinct, under the Constitution (Article III, Section 2). See COURTS.

Era, Chris'tian. See CHRISTIAN ERA.

E'ra of Good Feel'ing, in U. S. political history, the period of Monroe's administration, 1817–24, when, the Federalist Party having become practically extinct after the War of 1812, the sway of the Democratic-Republican Party was assured, so that, in 1821, Monroe was elected by 231 out of 232 votes. The harmony was, however, more apparent than real, for the bitter issues of the tariff, the national bank, slavery, etc., were becoming more and more insistent upon public attention.

Era of Mar'tyrs. See DIOCLETIAN ERA.

Erard (ā-rär'), **Sébastien,** 1752–1831; French inventor and maker of musical instruments; b. Strassburg, April 5, 1752; son of a cabinetmaker. His first pianoforte, constructed in 1780, may be said to have introduced that instrument into France. He soon became the best pianoforte maker in Europe, and in connection with his brother established a factory in London. The grand piano, with single and double action, was his invention. He built the great organ for the royal chapel of the Tuileries. He was also the inventor of a double-action harp which had immense popularity in London.

Erasis'tratus, Greek physician and anatomist; flourished abt. 300–260 B.C.; practiced for many years at Alexandria, where he taught anatomy and founded a school. His principal discoveries were the *viæ lacteæ* and the functions of the brain and nerves.

Eras'mus, Desiderius (originally *Geert, Geerts, Gerhard,* or *Gerhards*), abt. 1467–1536; Dutch scholar and philosopher; b. Rotterdam; entered the Augustinian convent of Steyn abt. 1482; became a priest and secretary to the Bishop of Cambrai, 1492; spent several years in Paris; thrice visited England, and during his longest stay, 1511–14, was Prof. of Greek at Cambridge; after a residence in Italy, was absolved from his monastic vows in 1516; in the same year he produced an edition of the Greek New Testament. He became a resident of Basel abt. 1521; removed to Freiburg, 1529. He was condemned as a heretic by the Sorbonne, but shortly before his death was offered a cardinalate, which he refused because of age and infirmities; strove to mediate between Catholics and Protestants; was preëminent as a restorer of classical learning and sound philosophy. Among his works are a book against Luther's doctrine of the will "De Libero Arbitrio"; "Colloquia," witty satires against the monks and the superstitions of the time; "Adagia," a collection of proverbs; and "Encomium Moriæ" ("The Praise of Folly").

Eras'tians, name originally applied to a distinct party in the Westminster Assembly, headed by Selden, Lightfoot, Coleman, and Whitelocke, because they advocated the views of Thomas Erastus with regard to church discipline. During the conflict in the Church of Scotland, which led to the establishment, in 1843, of the Free Church, those who maintained that the church had no power to nullify by law the operation of lay patronage were called Erastians, but they protested against this use of the word.

Eras'tus, Thomas, 1524–83; Swiss physician and theologian, whose proper name was Lieber; b. Baden; became Prof. of Medicine at Heidelberg, 1558, and at Basel, 1580; opposed the alchemists and the school of Paracelsus. He held controversies with the Lutheran divines on the Lord's Supper and with Dathenus and Beza on excommunication; and inspired the doctrine that all ecclesiastical authority is subordinate to the civil power, commonly called Erastianism. In theology he followed Zwingli, and he opposed Calvin's system of church government.

Erato (ĕr'ă-tō), one of the nine muses, the protectress of nuptial ceremonies, and the muse of erotic poetry.

Eratosthenes (ĕr-ă-tŏs'thĕ-nēz), 276–196 B.C.; Greek astronomer and geometer, and the first scholar to bear the name philologian; b. Cyrene; superintendent of the great library of Alexandria, and rendered important services to the sciences of astronomy and geography. He displayed great versatility, and wrote numerous works on philosophy, history, grammar, etc. Among his memorable performances was the measurement of the obliquity of the ecliptic, which he computed to be 23° 51′ 20″.

Er'bium, rare dyad earth-metal, chiefly procured, as an oxide called *erbia,* from gadolinite, along with yttria, both earths existing naturally as silicates. Metallic erbium (symbol E; atomic weight, 112.6) has not been separated. Its salts have mostly a rose color.

Ercilla y Zuñaga (ĕr-thēl'yä ē thōn'yĕ-gä), **Alonzo,** 1533–94; Spanish poet; b. Madrid; accompanied the future Philip II on his travels and the expedition against the Araucanians in Chile; afterwards was employed on various missions by Philip II; best known for his "La Araucana," the most celebrated of Spanish epics.

Erckmann-Chatrian (ĕrk'män-shă-trē-äń'), names of two French novelists whose works for many years were jointly produced, and, like those of Beaumont and Fletcher, are inseparably united. EMILE ERCKMANN, 1822–99; b. Pfalzburg; was the son of a bookseller, and after studying at the College of Pfalzburg applied himself to reading law in Paris. ALEXANDRE CHATRIAN, 1826–90; b. Soldatenthal, near Pfalzburg; was an usher in the Pfalzburg College when he made the acquaintance of Erckmann, 1847. The two became fast friends, and composed numerous stories, *feuilletons,* and dramatic pieces without much success. Unable to live in this way, Erckmann applied himself to the law, while Chatrian found employment in a railway office. "L'Illustre Docteur Mathéus," 1859, was the first of their

writings which attained any popularity; it was followed by "Contes Fantastiques," 1860; "Madame Thérèse," 1863, etc. Their novels on the events of the Revolution and the First Empire, "Histoire d'un Conscrit de 1813," 1864, "L'Invasion," 1865, etc., were much read, and after the German annexation of Alsace they produced a novel under the title of "Histoire du Plébiscite Racontée par un des 7,500,000 Oui," 1872, which made a sensation. Their literary partnership came to an end in 1889, when a quarrel and lawsuit terminated their friendship.

Erdmann (ĕrt'măn), **Johann Eduard**, 1805–92; German philosopher; b. Wolmar, Livonia; Prof. of Philosophy at Halle, 1836; chief works: "Outline of the History of Philosophy," "Nature and Creation," "Belief and Science," "Body and Soul," "The State."

Er'ebus, in classic mythology, the son of Chaos; also a dark and gloomy region or subterranean cavern through which souls were supposed to pass after death.

Erebus, Mount, and Mount Ter'ror, two volcanoes in S. Victoria Land, in latitude 77½° S., discovered by J. C. Ross, January 27, 1841. Mount Erebus, 12,400 ft., is, as far as is known, the volcano nearest to the S. pole, and when discovered was emitting flame and smoke. Mount Terror, 10,900 ft., is believed to be an extinct volcano. These mountains were named from the British ships in which Ross's expedition sailed.

Erechtheum (ĕ-rĕk-thē'ŭm), in ancient Athens, a sacred edifice on the Acropolis, containing the temple of Athena Polias and several other shrines. Its name was derived from Erechtheus, and a part of it is thought to be the "house" or shrine of that hero. It was burned by the Persians, rebuilt abt. 393 B.C., and became the most sacred of all the Athenian sanctuaries. The Erechtheum was a most beautiful structure of the Ionic order. Unlike other Grecian temples, it had three porticoes —one to the E., and occupying the whole width of the main structure; the other two facing the N. and S., somewhat like the transepts of a mediæval church. The ruins of the Erechtheum stand N. of the Parthenon, and are among the most interesting relics of antiquity. The six caryatides (female figures, larger than life, gracefully draped and carrying capitals on their heads) which supported the roof of the S. portico are particularly fine. One of these is in the British Museum, and its place is filled by a terra-cotta copy.

Erechtheus (ĕ-rĕk'thūs), hero of ancient Greek legends; a son of Vulcan or of Pandion, and the father of Cecrops. Homer represents him as a king of Athens. He was the founder of the Erechtheum.

Ere'tria, ancient city on the island of Eubœa mentioned by Homer. At an early period it was a prosperous and independent state, and one of the chief maritime cities of Greece. It was captured and ruined by the Persians, 490 B.C., but was soon rebuilt. Eretria was the seat of a celebrated school of philosophy, founded by Menedemus abt. 330 B.C.

Erfurt (ĕr'fort), town of Prussian Saxony; on the Gera, 15 m. W. of Weimar; has an old Gothic cathedral with a bell which weighs 275 cwt., many Protestant churches, royal academy, public library, normal school, and an edifice formerly occupied by the Univ. of Erfurt, founded 1392, and closed 1816. The Augustine convent of which Luther was an inmate for several years is now used as an orphan asylum. Erfurt has manufactures of silk, cotton, and woolen fabrics, hosiery, shoes, leather, etc. The Congress of Erfurt, held here, 1808, was attended by Napoleon, Alexander I of Russia, and several of the German princes. In 1850, the so-called Union Parliament held its sessions here. Pop. (1900) 85,202.

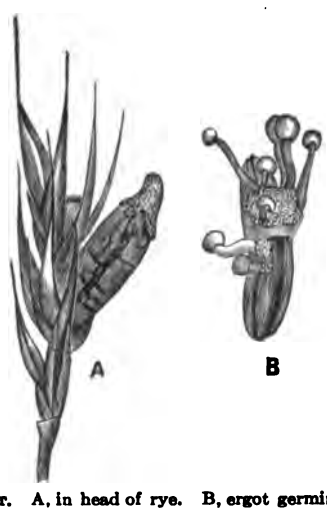
Erg, the absolute (C. G. S.) unit of work or of energy. It is the work of one dyne acting through a centimeter distance. The relation of the erg to the usual practical units of work and power is as follows:

1 kilogrammeter = 100,000 g. ergs.
1 foot-pound = 13,825 g. ergs.
1 watt = 10_7 ergs per second.
1 horse-power = $746 \times 10_7$ ergs per second.

Erganes (ĕr-gā'nēz), a king of Ethiopa, who, to save his own life, killed all the priests of Jupiter.

Er'gograph, or **Work Wri'ter**, machine which registers in foot pounds the exact effort made in the performance of any feat of strength that can be done in a gymnasium; determines exactly the relative and comparative strength of individual groups of muscles. Also, a machine for testing a child's capacity for study, by determining the degree of fatigue experienced by a set of muscles, from which is ascertained the exact power of endurance of the child.

Er'got, or **Spur**, in medicine, name of grains of rye or oats malformed by the presence of a minute fungus, *Claviceps purpurea*, formerly



ERGOT. A, in head of rye. B, ergot germinating.

known as spurred rye. Its production is influenced by the season, being more abundant in wet than in dry years. The use of ergotized

grain as food is attended with serious results, producing the disease known as ergotism, and several supposed epidemics of former times have been traced to the use of grain so diseased. It is much used to promote contractions of the uterus in various stages of labor, but should never be administered except by persons skilled in its use.

Er'ic IX (or VIII), d. 1160; King of Sweden; was of royal blood; elected to the throne of the Upper Swedes, 1150; rule afterwards embraced Lower Sweden; led crusade against the heathen of Finland, 1157; transplanted Swedish colonies thither, and laid the foundation for the conquest of that country; on return to Upsal, was mortally wounded in battle with Magnus Henrikson, a Danish prince; is called St. Eric because of his virtues, but has not been canonized.

Eric XIV, 1533–77; King of Sweden; son of Gustavus Vasa, whom he succeeded, 1560; made overtures of marriage to Elizabeth of England, to Mary Queen of Scots, and others, but finally married a Swedish peasant named Catharine Monsdotter. He was capricious, imprudent, momentarily insane, and always addicted to violent paroxysms of anger and cruelty. In his reign Sweden was involved in a war against Denmark. A conspiracy was formed against him by his own brothers and other nobles, who deposed him in 1568, and confined him in prison till his death.

Er'icsson, John, 1803–89; Swedish-American engineer; b. Langbanshyttan; entered the Swedish army, 1820, and was employed in surveys in N. Sweden; went to England, 1826; made numerous inventions, including the flame engine and the steam boiler on the principle of artificial draft, which principle is still retained in locomotives. The lightness and compactness of this led to the construction of a steam fire engine. In 1833 he reduced to practice his project of a caloric engine; and, 1836, successfully applied the propeller to purposes of navigation. In 1839 he settled in New York, and was employed in the construction of the war ship *Princeton*, the first steamship built with the machinery under the water line and out of the reach of shot. In the London Industrial Exhibition, 1851, he exhibited the hydrostatic gauge, the reciprocating fluid meter, the alarm barometer, the pyrometer, a rotary fluid meter, and a sea lead.

At the beginning of the Civil War he constructed the first iron war vessels with revolving turrets for the guns. The first of these, the *Monitor*, defeated the Confederate ironclad *Merrimac* (or *Virginia*) in Hampton Roads, March 9, 1862, and compelled the reconstruction of every great navy. In 1878 he developed in the torpedo boat *Destroyer* ideas included in his scheme of naval warfare first conceived and submitted to Napoleon III in 1854. In 1866 he entered on the study of solar physics, and devoted most of the remaining years of his life to this. He invented a solar engine, which he left as a legacy for the future, when the coal mines shall cease to supply the world.

Erictho'nius, son of Vulcan and Minerva, and King of Athens, who was very deformed in his feet, and invented coaches to conceal his lameness.

Erid'anus, in Greek legend, the name of the river Po. In astronomy, one of the fifteen ancient S. constellations. It winds like a river through the sky from the star of the first magnitude, Achernes, in the constellation Phœnix, past the feet of Cetus, to the star Rigel in Orion.

E'rie, capital of Erie Co., Pa.; on Lake Erie; 85 m. SW. of Buffalo, on a high bluff; the only lake port in the state; has the largest landlocked harbor on Lake Erie. The city has exceptional railroad facilities, giving it direct communication with the upper and lower oil, the lumber, and the bituminous coal regions of the state; chief industries, the manufacture of steam engines, machinery, railroad-car equipments, brick, leather, furniture, refined petroleum, beer and ale, flour and grist, and organs; chief shipments, coal, petroleum, iron ore, and lumber. Institutions include the City Hall, U. S. Govt. Building, State Soldiers' and Sailors' Home, U. S. Marine, St. Vincent, and Hamot hospitals, and Home for the Friendless. Erie occupies the site of the French Fort de la Presque Isle, built 1749; was laid out as a town, 1795; was Perry's headquarters in the War of 1812–15, and the scene of the building and equipment of the fleet with which he defeated the British at Put-in-Bay; chartered as a city, 1851. Pop. (1906) 59,993.

Erie Canal', largest and most important canal in the U. S., extending from Buffalo to Albany, N. Y., 363 m. long. De Witt Clinton was appointed a member of a commission to survey a route for the proposed canal from the lakes to the Hudson, 1810; and his memorial to the State Legislature, 1815, insured the success of the undertaking. The bill for its construction was passed, 1817; but the "canal policy" was for years strenuously opposed. In 1825 the canal was completed at a cost of $7,602,000, and navigation was opened in October. Clinton was at that time Governor of New York, and at the head of a naval procession he sailed down the Hudson from Albany, and poured a keg of the water of Lake Erie into the Atlantic. In construction the canal presents features of paramount interest. It is carried over several large streams on aqueducts whose construction required the greatest engineering skill. It crosses the Mohawk River twice, at Schenectady and at Cohoes. It has 72 locks, 57 double and 15 single. At Albany it rises 20 ft. by two double locks, 110 by 18 ft., and at W. Troy it is carried over a ridge 188½ ft. high by 16 double lift locks. In 1903 a popular vote sanctioned the expenditure of $101,000,000 for betterments on the Erie, Champlain, and Oswego canals. Up to 1909 the Erie alone had cost for construction and improvements over $52,540,800.

Erie, Lake, one of the chain of lakes drained by the St. Lawrence; constitutes part of the boundary between the U. S. and Canada. Ontario adjoins it on the N., and the states of

New York, Pennsylvania, Ohio, and Michigan on the S., E., and W. The Detroit River, entering from the N. near its W. end, brings the discharge of the upper lakes, and is its largest tributary. The Grand enters from the N., the Maumee from the W., and the Cuyahoga from the S. Its outlet, the Niagara, flows N. from its E. end. The length of the lake is 246 m., its greatest width, 58 m., and its area, 9,900 sq. m. Its surface lies 573 ft. above the sea and 326 ft. above Lake Ontario. It is the shallowest of the Great Lakes, its general depth being less than 100 ft., and its deepest sounding, 210 ft. A group of islands near its W. end are celebrated for their vineyards. Its commerce is large, passing westward through the Detroit River to the upper lakes, E. through the Welland Canal to Lake Ontario, and SE. via the ports of Buffalo, Erie, and Cleveland.

The battle of Lake Erie was fought near the W. extremity of the lake between a squadron of U. S. vessels commanded by Lieut. (afterwards Commodore) Perry, and a British squadron of six vessels under Capt. Barclay, September 10, 1813. Perry's squadron of nine vessels, but manned by an inferior force and mounting fewer guns, captured the British squadron after three hours' combat. This battle gave the U. S. the supremacy on the lake, and permitted the coöperation of the land and naval forces in the West, with the result of freeing Michigan from British occupation.

Eries, tribe of N. American Indians belonging to the Iroquoian stock, and inhabiting in the seventeenth century the territory extending S. from Lake Erie probably to the Ohio River, E. to the lands of the Conestogas along the E. watershed of the Allegheny River, and N. to those of the Neutral Nation. In 1656 the Iroquois invaded their territory, most of the Eries were killed, and the remnant of the tribe was incorporated with the Senecas.

Erig'ena, Johannes Scotus (Erigena probably a corruption of Hierugena, *i.e.*, of the Holy Isle, a common name of Ireland), b. between 800 and 815, d. probably abt. 880; boldest and most brilliant thinker of the ninth century; b. probably in Ireland; went to France abt. 843, where he was patronized by Charles the Bald, and became director of the palace school. He rebelled against Augustinianism, asserted the supremacy of reason, and wrought out a vague pantheism; was condemned as a heretic at Paris, 1209. He translated into Latin the works (spurious) of Dionysius the Areopagite, and thus planted the seeds of mediæval mysticism. Of his other works, the most important is the treatise, "Of the Division of Nature."

Erigone (ē-rĭg'ō-nē), daughter of Icarius, who hung herself when she heard that her father had been killed by some shepherds whom he had intoxicated. She was turned into the constellation of Virgo.

Er'ik the Red, discoverer of Greenland, therefore probably the first white man who visited America. He was born abt. 950 in Jædern, Norway, whence he with his father, Thorwald Osvaldson, removed to Iceland on account of manslaughter; banished from Iceland for the same reason, he set out on a voyage of discovery in search of land reported to have been seen W. of Iceland by Gunnbjorn, son of Ulf Krage, in 876. He sailed W. from Iceland, and in 982 discovered the unknown land, which he called Greenland, in order, by the pleasing name, to attract settlers. After remaining there three years he returned to Iceland. In 986 he returned to Greenland, accompanied by many new settlers, who established a colony in Eriksfjord, thought to correspond to the present Tunnudluarbik and surroundings. Erik's son Leif was the discoverer of America (Vinland).

E'rin. See IRELAND.

Erin'na, Greek poet who lived abt. 600 B.C., and was a friend of Sappho; acquired a high reputation by her lyric and other poems, among which was "The Distaff." It is said that she died at the age of nineteen. Fragments of her poems may be found in Bergk's "Poetæ Lyrici Græci."

Erinys (ē-rīn'ĭs), plural **Erin'yes,** name given to the Furies or Eumenides.

E'ris, Greek mythology, the goddess of discord, sister of Ares and daughter of Nyx (night). At the marriage of Peleus and Thetis, as she had not been invited, she showed her displeasure by throwing into the assembly of gods a golden apple inscribed with "Let the beauty among you take me." It was claimed by Hera, Athene, and Aphrodite, and its award by Paris to Aphrodite led to the Trojan War. Discordia was the Roman counterpart of Eris.

Eritrea (ĕ-rĭt'rē-ă), Italian colony on the African coast of the Red Sea, organized 1890–91; formerly a part of Abyssinia; extends along the coast 670 m., from Cape Kasar to the Strait of Babel Mandeb; area about 88,500 sq. m.; pop. estimated at 450,000; climate generally tropical, and water scanty in the colony proper. Little agriculture is practiced, and cattle, hides, and tallow are the chief exports. Pearl fishing is carried on at Massawah and Dahlak. Asmara is the seat of government. The colony is autonomous, the central government at Rome being represented by a civil governor, who is under the direction of the Minister of Foreign Affairs.

Erivan (ĕ-rē-vän'), fortified town of Russian Armenia; government of Erivan; on the Zenga, near where it flows into the Aras; 115 m. S. by W. from Tiflis; a cannon foundry and manufactures of cotton goods, earthenware, and leather. It was stormed and taken by the Russian general Paskewitch, 1827, and was ceded to Russia by Persia, 1828. Pop. (1897) abt. 15,000.

Erl'king, in German and Scandinavian mythology, a fabulous being which, through seductive allurements, causes injury and destruction to human beings, especially to children.

Er'mine, or **Stoat,** species of weasel (*Putorius erminea*) inhabiting the cooler portions of Europe and Asia; preys on mice, poultry,

eggs, young rabbits, etc., and like the other weasels emits a most offensive odor when irritated. In winter the whole of the body is covered with white fur, slightly tinged with yellow, but the tip of the tail remains black in all seasons. The fur is closer and finer in winter, and that from Siberia, Norway, and other cold countries is one of the most valuable of furs. The fur called miniver is a variety of spotted, "powdered," or "timbered" ermine. The ermine fur forms the distinctive doubling of the state robes of sovereigns and nobles, as well as of their crowns and coronets. It is also worn by judges in some countries. N. America furnishes a very small part of the ermine fur of commerce, although most fur so called is simply white-rabbit fur, with spots of black-rabbit fur inserted.

Erne (ĕrn), river of Ulster, Ireland; flows nearly NW. through Co. Fermanagh; expands into two beautiful lakes, called Upper and Lower Lough Erne; after a course of 72 m. enters Donegal Bay. The Lower Lough is 20 m. long, 7 m. wide, and over 200 ft. deep. The town of Enniskillen stands on an island between the loughs, which are 140 ft. above the sea.

Er'nest (Ernst) I, surnamed THE PIOUS, 1601–75; Duke of Saxe-Gotha; b. at the castle of Altenburg; brother of the famous Bernard of Saxe-Weimar. In the Thirty Years' War he served with distinction under Gustavus Adolphus; completed the victory of the Swedish army at Lützen, where Gustavus was killed. He was a zealous Protestant, and a ruler of great wisdom and activity.

Ernest Augus'tus, 1771–1851; King of Hanover; fifth son of George III of England; styled the Duke of Cumberland before he became king, and was a field marshal in the British army; on the death of his brother, William IV, 1837, inherited the throne of Hanover; was the object of intense popular dislike in England and Germany; in Hanover he was a tyrant. In 1848 he was forced, in order to keep his throne, to grant liberal reforms.

Ernes'ti, Johann August, 1707–81; German critic and the founder of a school of theology; b. Tennstedt, Thuringia; was so excellent a Latin scholar that he was called the "German Cicero"; Prof. of Ancient Literature, Univ. of Leipzig, 1742, and obtained the chair of Rhetoric, 1756, to which the chair of Theology was added, 1758. In theology he was liberal or rationalistic. He was the founder of the grammatico-historical exegetical school of New Testament interpretation in his "Elements of Interpretation."

E'ros, Greek name of the god of Love, the Cupido of the Romans. In Hesiod, Eros is one of the great cosmogonic powers, but later poets represent him as a son of Aphrodite. See CUPID.

Ero'sion, in geology, the action of a current of water, as in a river, in excavating or enlarging its channel, the gradual abrasion of strata, by rain, frost, glaciers, etc. The deep hollows occupied by most lakes and rivers are supposed to have been formed by the action of rivers or glaciers, and are called "valleys of erosion." The action of atmospheric agencies, glaciers, etc., in wearing away the general surface of a country or district is called surface erosion, degradation, or denudation.

Errard (ā-rär'), **Charles,** 1606–89; French painter and architect; b. Nantes; was patronized by Louis XIV, for whom he adorned the Louvre, Tuileries, and other palaces; was one of the twelve artists who founded the Academy of Painting in Paris in 1648, and was the principal founder of the French Academy of Art in Rome.

Er'ror, Writ of. See WRIT.

Erskine (ėr'skĭn), **Ebenezer,** 1680–1754; Scottish clergyman; b. Dryburgh, Berwick; preached at Portmoak, Kinross, 1703–31, and acquired a high reputation. In 1731 he removed to Stirling, where he advocated popular rights in the settlement of ministers, and differed from the majority of the General Assembly in relation to lay patronage; was deposed or suspended, 1733. In 1736 Erskine and his friends seceded and organized the Secession Church. In 1847 the Secession Church united with the Relief Church to form the United Presbyterian.

Erskine, John (eleventh Earl of Mar), 1675–1732; Scottish Jacobite and politician; b. Alloa; secretary for Scotland, 1708; in September, 1715, took arms for the Pretender, and obtained the command of about 12,000 insurgents; defeated by the Duke of Argyle at Dunblane in November, 1715, and soon escaped to the Continent.

Erskine, Thomas (Lord), 1750–1823; British jurist and orator; b. Edinburgh; youngest son of Henry David, Earl of Buchan; called to the bar, 1778; in 1781 secured the acquittal of Lord George Gordon, impeached for treason, and in 1789 that of Stockdale, arraigned for libel against the House of Commons; acted as counsel, 1792, to Thomas Paine, prosecuted as author of "The Rights of Man"; in 1794 secured the acquittal of Hardy, Horne Tooke, and others, charged with treason and political conspiracy. He was elected to Parliament in 1783, and reëlected, 1790; on the formation of a Whig ministry in 1806 was appointed Lord Chancellor, and raised to the peerage as Baron Erskine; resigned office, 1807, when the Tories came into power. He published "Armata," a political romance, and "View of the Causes and Consequences of the War with France."

Erysip'elas, once popularly called ST. ANTHONY'S FIRE, inflammatory disease of the skin, caused by a specific microörganism, the *Streptococcus erysipelatis*, and associated with a rose-colored eruption of the skin. The inflammation is of a peculiar low type, which tends to extend. It may terminate favorably by resolution, less favorably by abscess (which is apt to be diffuse, *i.e.*, not limited to a single spot, and is then very dangerous), or the termination may be in gangrene and the death of the patient. The disease used to be common

in military hospitals, seating itself in wounds, when it often proved fatal. Erysipelatous diseases sometimes present a distinctly infectious and almost an epidemic character, being aided by filth and antihygienic surroundings. Puerperal fever, peritonitis, phlebitis, and a long catalogue of diseases of low type are akin to erysipelas. The best treatment is a sustaining one. The patient should be isolated. Pure air, milk diet, and quinine and iron, with stimulants, are indicated. Externally, it is safest to use only the blandest applications, carbolized lotions, etc. Treatment with a serum has been tried.

Erwin von Steinbach (ėr'wĭn fŏn stīn'bäkh), 1240–1318; German architect; b. Strassburg; appointed in 1275 master of the works of the Cathedral of Strassburg, then about half finished; planned the W. front and towers, and carried on the work until his death; designed other churches and monasteries in Alsace, and directed the work on the fortifications of Strassburg.

Erzerum (ėrz'rōm), *i.e.*, land of Rome, or Byzantium, so called because it was originally founded under the E. Roman Empire, town of Armenia, Asiatic Turkey, capital of the Turkish vilayet of the same name; on the Kara-Su, a branch of the Euphrates; 120 m. SE. of Trebizond; is 6,200 ft. above sea level. It has an extensive trade, carried on partly by caravans. The principal manufactures are of copper, tin, iron, and leather. The inhabitants own large sheep farms in the mountains or keep sheep and cattle in the town, sending them out daily to mountain pastures. The climate is very severe, snow covering the ground for about six months. Pop. estimated at 40,000, mostly Turks. A town called Theodosiopolis was founded here, 415 A.D.

Erzgebirge (ĕrts-gė-bēr'gė), *i.e.*, ore mountains, mountain chain of S. or high Germany; along the boundary between Bohemia and Saxony; nearly 120 m. in length and 25 m. broad. The Schwarzwald and Keilberg, the highest parts of this chain, have an altitude of about 4,000 ft. The range is rich in silver, tin, iron, and cobalt. On the NW. side it is broken by beautiful and fertile valleys. On the N. foot of the mountains are two extensive coal fields which, with the abundant water power, have made this region the great industrial center of Saxony. Chemnitz, the chief town, is called the Manchester of Germany.

Esarhad'don, Old Testament name of an Assyrian king, the son and successor of Sennacherib. He appears to have reigned from 680 to abt. 667 or 668 B.C. His rule extended N. to Armenia, on the W. it included Syria and Cyprus, while on the S. Egypt and even Ethiopia were claimed by him. He built a palace at Babylon.

E'sau (rough, hairy), elder twin brother of the patriarch Jacob (Israel), and the son of Isaac and Rebekah (Gen. xxv, 25); took his name from his hairiness of body. He was the progenitor of the Edomites, who dwelt in Mt. Seir or Edom.

Esbjörn (äs'byörn), **Lars P.,** 1808–70; founder of the Swedish Lutheran Church in America; b. Sweden; came to the U. S., 1849; pastor at Andover, Ill., 1849–56; at Princeton, Ill., 1856–58; Prof. Illinois State Univ., Springfield, Ill., 1858–60. In 1860 he organized the Swedish Augustana Synod, and became president of its theological seminary. Returning to pastoral work in Sweden, 1862, he died there.

Escalade (ĕs-kă-lād'), in war, an assault in which ladders are used in surmounting the obstacles presented by the scarp and counterscarp walls (or slopes) of a fortification in which no breach has been made; sometimes even a rapid blow directed at an unbesieged place with hope of success by surprise (*e.g.*, the capture by the English troops of Almarez, 1812). Among the most famous escalades are those of Adrianople by the Goths; of Beauvais by Charles the Bold, 1472; of Fécamp, 1593; of Prague, 1741.

Eschatology (ĕs-kă-tŏl'ŏ-jĭ), that section in dogmatics which treats of the second advent, the intermediate state, the resurrection, the last judgment, heaven, and hell. On these themes revelation does not go into details, while yet the salient points are strongly marked. The passages which must be relied upon to furnish data are Matt. xxv, Luke xvi, xxiii, 43, John xiv, 23, I Cor. xv, II Cor. v, 2, II Thess. i, ii, Rev. xx and xxi.

Escheat (ĕs-chēt'), a reverting of lands to their original owner (lord of the fee) because of some obstruction in the course of descent, either by failure of heirs of corruption or blood (now abolished) when the tenant has been convicted of treason or felony. An escheat differs from a forfeiture in the fact that the latter is a penalty for a crime, and the property forfeited accrues to the person injured or the sovereign, while escheat depends solely on the failure of heirs, and the land reverts to the former owner. In the U. S. the doctrine of escheat has a limited application; still, if an owner of land dies without heirs, it is said to escheat to the state. The state takes an escheat subject to any charges or encumbrances attaching to the land when its title accrued. In Great Britain, and generally in the U. S., the subject is regulated by statute.

Eschenbach (ĕsh'ĕn-bäkh), **Wolfram von,** d. abt. 1220; German mediæval poet and minnesinger; b. of a noble family, at Eschenbach, near Ansbach, Bavaria; in 1203 went to the court of Hermann, Landgrave of Thuringia, whose bounty he enjoyed until 1215. His principal poems are "Parcival" and "Willehalm," which are much admired.

Eschweiler (ĕsh'wī-lėr), town of Rhenish Prussia; 8 m. ENE. of Aix-la-Chapelle; has manufactures of ribbons, canvas, needles, glass, machinery, and woolens. There are mines of coal, zinc, and lead in the vicinity. Pop. (1900) 21,903.

Escobedo (ĕs-kō-bā'dō), **Mariano,** 1827–1902; Mexican military officer; b. Galeana, Nueva

Leon; served in the war with the U. S., 1847–48; the "Reform War," 1858–61, and in the resistance to the French invasion, 1862–63; besieged the Emperor Maximilian in Queretaro, took him prisoner, May 14, 1867; ratified the decree of the courtmartial which condemned the emperor to death. Later he was in command of the republican armies and Minister of War.

Escu'rial, monastery and royal palace near Madrid, Spain, built by Philip II, and dedicated to St. Lawrence on occasion of the victory of St. Quentin, 1557, on that saint's day. According to doubtful tradition, it was built in the form of the gridiron on which that saint was broiled alive. It is one of the largest and perhaps one of the most tasteless buildings in Europe, though grand from its size. The church in the center of this enormous mass of stone is very large and rich. The Pantheon, a repository beneath the church, is the place of interment for the royal family. The most valuable treasures of the Escurial are the collection of ancient manuscripts in the library, especially those of Arabian writers.

Esdraelon (ĕs-drā-ē'lŏn), in the apocryphal book of Judith, ESDRELOM, the most picturesque, most fertile, and historically most important plain in Palestine, "lying between Tabor and Carmel, and between the hills of Galilee on the N. and those of Samaria on the S." In Scripture it is twice (II Chron. xxxv, 22; Zech. xii, 11) called "the valley (plain) of Megiddo." Jezreel is properly the SE. part of it, although this name is sometimes given to the whole. It is triangular, the length of its SE. side being about 15 m., its SW. about 18 m., and its N. about 12 m. The greater part of the plain is drained by the Kishon, which empties into the Mediterranean near Acre. This great plain has been the scene of several important battles, and with it are associated the names of Barak, Gideon, Saul, Josiah, the crusaders, and Napoleon.

Es'dras, Books of, certain books of the Old Testament and of the Apocrypha ascribed to Ezra, whose name is Græcized into *Esdras*, following the Septuagint. The canonical books of Ezra and Nehemiah (of the Authorized Version) are denominated in the Vulgate and in the Thirty-nine Articles of the Anglican Church the first and second books of Esdras, while the apocryphal books, now generally known as the first and second of Esdras, are there called the third and fourth of Esdras. The Geneva Bible, 1560, first adopted the present nomenclature, calling the two apocryphal books first and second Esdras.

Es'kimos, a race inhabiting the Arctic coasts of N. America, from Greenland to Bering Strait, and extending into Asia. They consist of three principal stocks—the Greenlanders; the Eskimos proper, in Labrador; and the W. Eskimos, found along Hudson Bay, the W. side of Baffin Bay, the polar shores as far as the mouths of the Coppermine and Mackenzie rivers, and both on the American and Asiatic sides of Bering Strait. In their own tongue they are called Innuit, a word meaning "men," while the word Eskimo is said to be an Algonkin term of reproach, meaning "eaters of raw meat." In color they are lighter than the Indians, and shorter in stature. Their hair is black, their hands and feet small, and their faces flat and oval.

Their winter houses are subterranean, built of puncheons and whale's bones covered with earth or of snow cut into blocks, and made in shape of a dome. The entrance is by means of a long, low gallery, with a succession of skin doors to exclude the cold. An open fire or lamps of stone, filled with blubber and having wicks of moss, afford light and heat, and fire for cooking. In the summer the underground abodes are deserted for tents or temporary shelters that may be easily transported. The clothing of the Eskimo is made of the skin of animals or birds, from which the fur or feathers are not removed. The men are employed chiefly in obtaining the means of subsistence, while the women are occupied in preparing it for use. Their dainty boats or *kajaks* for a single hunter are made by stretching prepared sealskins over a frame. Upon the land or over the ice floe the means of transportation is the sledge drawn by dogs. By this conveyance the Eskimo takes long journeys, transports his effects from place to place, and brings to his family huge loads of food and furs. Fishing is done with lines and nets, or with fish spears. Frequently the nets are set under the ice. The fishing hooks are marvels of workmanship.

In manufactures the Eskimos are ingenious. Men carve objects of use as well as of ornament from ivory, antler, horn, and wood. Women spend their time in making garments and tents. Both men and women cover everything which they manufacture with etching and carvings or embroidery. Between the tribes of each typical area constant intercourse and traffic are maintained, and long journeys are taken to secure wood or soapstone, or harder materials for their implements. The clan system seems not to exist among them. Each fjord or hunting center is the seat of the village, and frequently a number of these villages are sufficiently near to give rise to a tribe. In each communal house there is a group of families, and often one of the older men is obeyed as a leader. In the winter the community becomes more compact, but in summer it spreads out in groups over the area visited by game and flocks of migratory birds. The religion of the Eskimo is animistic. All things are ensouled, and spirits innumerable are everywhere. The medium of communication between the laity and the spirit world is the angakok, who corresponds to the medicine man of the Indian.

Esla'ba, Sebastian de, 1698–1759; Spanish military officer; b. Eguillor; early entered the army, distinguished himself in the service of Philip V, and attained the rank of lieutenant general, 1738; Viceroy of New Granada, 1740–44, and his term was memorable for his brilliant defense of Cartagena against the English, 1741. After his return to Spain Eslaba was made captain general, and for some years Minister of War.

E'sop. See ÆSOP.

Esoph'agus, the gullet, that part of the alimentary canal that leads from the pharynx to the stomach. In the adult man it is 9 in. long, extending in a nearly vertical line from the fifth cervical vertebra through the posterior mediastinum and through the esophageal foramen of the diaphragm, ending in the cardiac orifice of the stomach. It has an outer or muscular coat, containing an outer layer of longitudinal muscle fibers, and another of similar annular fibers, the upper fibers being chiefly striped and partly voluntary in the upper parts, but entirely involuntary and nonstriated in the lower portion. The middle or cellular coat abounds in glands which open by long ducts. The innermost or mucous coat is lined by scaly epithelium. In caliber the esophagus is the smallest part of the alimentary tube. In the lower animals the esophagus has several modifications, the most remarkable of which is that singular dilatation which is called the *crop*, and which is observable in gallinaceous and vulturine birds, etc. Most articulate and many molluscous organisms have also a so-called esophagus.

Esoter'ic, designating or pertaining to those doctrines which are designed for the initiated only. The ancient philosophers are supposed to have had a set of mysterious doctrines, which they imparted to their more enlightened and intimate disciples, and other doctrines, more popular, for the benefit of the multitude; the latter are designated as exoteric.

Español'a. See SANTO DOMINGO.

Espartero (ĕs-pär-tā'rō), **Baldamero** (Duke of Vittoria), 1792–1879; Spanish military officer; b. Granatula, La Mancha; fought with great distinction in S. America, 1815–25, and put down the Carlist insurrection, 1833–40, for which he was made a general, grandee of Spain, and duke. in 1841 he took the place of the Dowager-Queen Christina as regent during the minority of Queen Isabella, but in 1843 a revolution declared Isabella of age, and Espartero was banished; took up his residence in England until 1847, when the law of exile was canceled and he returned. He was Prime Minister, 1854–56, and after the revolution of 1868 twice mentioned as a candidate for the vacant throne.

Espar'to, species of grass (*Stipa tenacissima*) growing in Spain, Barbary, etc.; has a strong fiber, which is used by the Spaniards for making cordage, mats, nets, etc. Large amounts are used in Great Britain in the making of paper, which is generally of good quality.

Esperan'to ("the hoper"), proposed international language created by Dr. L. L. Zamenhof, of Warsaw, first published in 1887. Its aim is not to displace existing idioms, but to be a second language for all. It is claimed that its grammar has but sixteen rules with no exceptions, and that three fourths of its root words are familiar to everyone of ordinary education, for in choosing root words those common to the largest number of languages were chosen in order.

The most characteristic features of the language are as follows: Each letter has its own invariable sound, thus strict phonetic spelling is possible, and every word is to be read as it is written. Substantives are formed from the root word by adding *o*, adjectives by adding *a*, and adverbs *e*. There is no indefinite, and only one definite article, *la*. Plurals are formed by adding *j*. There are only two cases, the noninflected nominative and the inflected accusative, formed by adding *n* to the nominative, singular and plural. All prepositions govern the nominative; the possessive is formed by *de*. The verb never changes its form for number or person, and *as*, *is*, and *os* serve to indicate the three fundamental tenses; the conditional, imperative, and infinite moods are formed by adding *us*, *u*, and *i*. The active participles, ending in *ant*, *int*, and *ont*, become substantives, adjectives, or adverbs by adding *o*, *a*, or *e* respectively. The passive participles are formed by adding *at*, *it*, and *ot*.

The personal pronouns are *mi* (I, me), *ci* (thou, thee), *il* (he, him), *ŝi* (she, her), *ĝl* (it), *nl* (we, us), *vi* (you), *ili* (they, them), *si* (himself, herself, itself, themselves, oneself), and *onl* (one, people, they). The personal pronouns in the objective case take the accusative *n*, and by adding the adjective *a* become possessive pronouns. Adjectives form the comparative degree by adding *pli*, the superlative by adding *plej*. Cardinal numbers never change their forms, and tens and hundreds are formed by simple junction of the numerals. Ordinals add the adjectival *a* to the cardinals. The alphabet is as follows: a b c ĉ d e f g ĝ h ĥ i j k l m n o p r s ŝ t u ŭ v z.

EXAMPLE OF ESPERANTO.

La patr'o est'as tre bon'a. Mi vid'is grand'a'n
The father is very good. I saw a great
hund'o'n en la ĝarden'o. Mi parol'os hodiaŭ al
dog in the garden. I shall speak to-day to
mi'a patr'o pri la libr'o. Don'u al mi la libr'et'o'n.
my father about the book. Give me the booklet.
La bird'o'j hav'is nest' o'j'n en la arb'o'j. Ven'u al
The birds had nests in the trees. Come to
mi hodiaŭ vesper'e. Ĉu vi dir'as al mi la ver'o'n?
me to-day evening. Whether you tell me the truth?
La dom'o aparten'as al mi. Sinjor'o Petr'o kaj
The house belongs to me. Mr. Peter and
li'a edz'in'o tre am'as mi'a'j'n infan'o'j'n.
his wife much love my children.

See VOLAPUK.

Espinhaço (ăs-pēn-yă'sō), **Ser'ra do,** mountain chain in E. Brazil, properly a branch of the Serra da Mantiqueira, and forming part of the great coast-range system; it lies E. of and parallel to the river São Francisco; highest peak, Caraço, near Ouro Preto (5,750 ft.).

Esprits Forts (ĕs-prē' fōr), French, "bold spirits," school of advanced thinkers in France, numbering among them Voltaire, Diderot, d'Alembert, and Helvétius. They opposed the doctrines and practices of the Church, and wished to substitute the worship of reason.

Espronceda (ĕs-prōn-thā'dă), **José de,** 1810–42; Spanish poet; b. Estremadura; perhaps

the best representative of Byronic romanticism in that country. His restless life began with imprisonment at the age of fourteen for belonging to a revolutionary society, Los Numantinos. After his release he wandered to Lisbon, London, and Paris. In Paris he fought at the barricades in 1830. He enrolled himself among the volunteers to free Poland from Russia. Returning to Spain, he lived in the midst of republican and revolutionary plots until his premature death. He left behind him portions of two narrative poems, "Pelayo" and "El diablo Mundo"; a novel, "Sancho Soldaña"; and a few lyric poems of great power and beauty.

Esquimalt (ĕs'kē-mält), harbor and British naval station on the SE. end of Vancouver Island; 3 m. W. of Victoria, capital of British Columbia; is strongly fortified, has a naval arsenal, and is connected by rail with the coal mines of Nanaimo. It is an excellent anchorage for ships of any size, has a fine graving dock, and is the rendezvous of British war ships on the Pacific coast of N. America.

Es'quimaux. See ESKIMO.

Esquirol (ĕs-kī-rōl'), **Jean Étienne Dominique,** 1772–1840; French physician and philanthropist; b. Toulouse; founded at Paris, 1799, an asylum for the insane, which was a model institution, and initiated a reform in the treatment of the insane; in 1817 began a course of clinical lectures for mental maladies, on which he wrote a valuable work.

Es'say, a prose work of such length that it may be read at a sitting and composed rather to conform to literary canons than to give complete information. Essay writing is an excellent method of early literary practice, as it brings into play all the student's ability to construct sentences and paragraphs bearing in an orderly manner upon some historical, scientific, literary, moral, or biographical topic. Before beginning an essay, it is a good plan to jot down a brief outline of the arguments, illustrations, and conclusions to be treated. Indeed, the preparation of such briefs is in itself an important help to orderly and logical thought, qualities perhaps of more practical importance than the ability to write an essay, faultless according to literary rules, but which, like the theses written by Chinese candidates for public office, merely polish commonplace truisms without eliciting a new thought. Montaigne is the father of essay writing, though his rambling style can hardly be taken as a model. Bacon's essays, on the other hand, exemplify the most concise method of writing and deserve close study. English essay writing reached its height in the *Spectator* papers of Addison and Steele. In modern English literature the student has a wide choice. He may form his style upon the clear, virile, but rather loud methods of Macaulay the more delicate melody of De Quincey, the inimitable intimacy of Lamb, the scholarship of Matthew Arnold, or the subdued word harmonies of Walter Pater. He should, however, strive rather to develop his own style than to follow the strongly individual expressions of such writers as Carlyle or Emerson. Among the best American essayists are G. W. Curtis, Emerson, Holmes, and Lowell.

Es'sen, town of Rhenish Prussia; near the Ruhr; 27 m. NE. of Düsseldorf; has a cathedral, *gymnasium, realschule,* and an asylum for deaf-mutes; also manufactures steam engines, firearms, woolen cloth, paper, and iron wares; derives its prosperity chiefly from the coal mines which surround it. Here are Krupp's foundries, the largest in the world, employing 30,000 men. Pop. (1900) 118,863.

Essenes (ĕs-sēnz'), latest, and apparently the smallest, of the three Jewish sects in existence in the time of Christ. The Essenes were mystics, and most of them celibates. The greater part of them lived by themselves near the NW. shore of the Dead Sea, but they were also scattered in various parts of Palestine, and are supposed to have numbered in all some 4,000 or 5,000. The first distinct trace of them is about 110 B.C., and they disappear from history after the destruction of Jerusalem by the Romans.

Essen'tial, or Vol'atile, Oils, large class of compounds, mostly of vegetable origin, though some are derived from animal sources. They mostly exist already formed in plants. Many are isomeric (or identical in composition) with oil of turpentine and with caoutchouc. These are called terpenes ($C_{10}H_{16}$); others are aldehydes; still others appear to be compounds of alcohol radicals with organic acids, etc. They are in many cases changed by time and exposure into resins, or resolved into several distinct substances.

Essequibo (ĕs-sā-kē'bō), largest river of British Guinea, rising in the Acaraí Mountains, 41 m. N. of the equator, and flowing to the Caribbean Sea; length, 625 m. Except in the last 50 m. it is much obstructed by rapids and falls. The mouth is 15 m. broad, but dangerous for navigation. The Rupununi, a W. branch, is 220 m. long. Venezuela claims the Essequibo as her E. boundary, but a large region W. of the river is in the possession of the British.

Es'sex, Robert Devereux (second Earl of), 1567–1601; English courtier; b. near Bromyard Hereford; eldest son of Walter, first Earl of Essex; served at the battle of Zutphen; in 1857 he became Master of the Horse; after the death of Leicester, 1588, the declared favorite of Queen Elizabeth. He commanded the land forces of the expedition which took Cadiz, 1596, and was made Earl Marshal of England, 1597; later Lord Lieutenant of Ireland, and sent in 1599 to subdue a revolt of the Irish, but was not successful; was removed from office, deprived of all the honors the queen formerly had showered on him, tried for treason, and beheaded.

Essex Jun'to, The, name first applied by John Hancock abt. 1781 to a group of political leaders who lived in Essex Co., Mass., or had business connections there. The interests of this section was commercial, so that the

Essex Junto became the personification of the desire of the commercial interest for a stronger Federal union. Prominent members of the Junto were George Cabot, the Lowells, Timothy Pickering, Theophilus Parsons, Stephen Higginson, and Benjamin Goodhue; Fisher Ames sympathized with them strongly. The Junto joined the Federalists and became the extreme wing of that party. On the succession of Adams the members of the Junto followed Hamilton. At the time trouble was threatened with France, Pres. Adams tried to throw on the Essex Junto the responsibility for the "war scare," and denounced them as a British faction. When opposition to the "restrictive system" (see EMBARGO) arose in New England, the name "Essex Junto" became a synonym for New England federalism.

Estaing (ĕs'tăn'), **Charles Hector** (Comte d'), 1729–94; French naval officer; b. Auvergne; served in the army in India, 1757, and was appointed lieutenant general of the naval forces, 1763; commanded as vice admiral a fleet sent, in 1778, to fight for the U. S. His fleet was damaged by a storm near Newport in August of that year. He soon repaired his ships, and sailed to the West Indies, where he captured Grenada in 1779; in September, 1779, he attacked the British at Savannah, without success. He returned to France in 1780, and afterwards devoted himself to politics. In the Revolution he supported the king and queen, and was guillotined.

Estate', word sometimes used to indicate property generally, whether real or personal; sometimes the former alone. In law it denotes the interest one may have in property, and means the time during which ownership exists, as for a year, or for life, or forever. Under the common law, estates in land are divided, as regards the quantity of interest, into two general divisions, freehold estates and estates less than freehold. A freehold is an estate which may last for life or longer. An estate which is circumscribed within a certain number of years, or one in which the possessor has no fixed right of enjoyment, is less than freehold, even if it should, in fact, endure longer than the life of its first possessor; it is in the eye of the law personal property, and does not descend to heirs, though it may pass to executors or administrators. Estates less than freehold are divided into estates for years, at will, and by sufferance. An estate for years is an estate for a determinate period, whether it be for a longer number of years than a human life, or for only a part of one year. An estate at will exists where one man lets land to another to hold at his will, as well as at that of the lessee. An estate by sufferance arises when one comes into possession of land by agreement, and holds over after his original estate has expired, and without any agreement, express or implied, to continue it. The landlord has a right to enter at any time, and dispossess the occupant without notice.

Estates, The Three, or the **Estates of the Realm,** the three classes of feudal society: (1) the nobles, (2) the clergy, and (3) the commons, including the bourgeois or middle class of towns and the peasantry. The term "estates of the realm" was used in Scotland before the Union, 1707, as synonymous with "parliament." The "States General" of France were rarely convened after the fourteenth century, and had little or no legislative power. One of the exciting causes of the French Revolution was the dispute which arose, 1789, between the "third estate" (*tiers état*), or bourgeois, and the nobles and clergy, as to whether the third estate had a right to sit with the first and second. A convention of the States General was long (1580–1795) the supreme power in the Dutch republic.

Este (ĕs'tā), ancient sovereign family of Italy, from which the monarchs of Great Britain are descended. The family received several districts and towns to be held as fiefs of the German or "Holy Roman" Empire. Albertazzo II married a German princess of the house of Guelph (or Welf). Their son, Guelph IV, received in 1071 the investiture of the duchy of Bavaria, and was ancestor of the houses of Brunswick and Hanover.

Es'ther, Persian name of HADASSAH (myrtle), beautiful Jewish maiden who became the Queen of Xerxes, King of Persia, 486–465 B.C. She was a cousin and foster daughter of Mordecai, the Benjamite, who became Prime Minister of Persia in place of Haman the Amalekite.

The BOOK OF ESTHER, one of the latest of the canonical books of the Old Testament, consists of ten chapters, and relates events which gave rise to the Jewish feast of Purim. The Jews call it emphatically *Megillah*, the Roll. The whole of it is read in Jewish synagogues every year at the feast whose origin it explains. The inspiration of the book and its right to a place in the canon have been questioned. Much account is made of the singular fact that the name of God does not once occur; that, although fasting is spoken of, no mention is made of prayer; and that the religious tone of the book is low. But it is urged that the providence of God is magnified; that it gives a vivid picture of manners and morals at the Persian court; and, above all, a valuable exemplification of the unspiritual character of that portion of the Hebrew people who chose not to return to the Holy Land. Its author is unknown.

The APOCRYPHAL BOOK OF ESTHER consists of the ten canonical chapters of the book of Esther, with interpolations here and there, and the addition of six chapters at the end. These additions are found in the Septuagint, and in versions made from it, but not in the Hebrew. For this reason Jerome placed them together at the end of Esther, but Luther was the first to place them in the Apocrypha. The object of the unknown author was to give a more religious tone to the original book of Esther. Though considered spurious by all Protestant churches, the Greek, Armenian, and Roman Catholic churches accept these additions as canonical.

Estiva'tion, summer sleeping of animals which, like the African mudfish (*Protopterus*) and some mollusks, lie dormant during hot weather; contrasted with hibernation.

Estop'pel, in law, a principle whereby one is bound by his previous admission or declaration —not on the ground that it is true, but because to permit the gainsaying it is regarded as contrary to sound policy, and the ends of justice. Thus: A principal may by his conduct be estopped to deny that a certain person is his agent; one who has permitted himself to be held out as a member of a mercantile firm may be estopped as to creditors from denying his membership; a man who has held out a woman as his wife may be estopped from proving that she is not, as to tradesmen who have in good faith supplied her with necessaries on his credit; a statement in a bill of lading that the goods were received in good order cannot be contradicted as against a person who has made advances relying on the truth of that statement; a bank may be estopped by the act of its cashier in certifying a check. The principle has been extended to the law of real estate; thus, an owner of land who has induced another to incur heavy expenditure on the representation that the latter was owner would be estopped from asserting his own title.

Estril'dis, in mythology, daughter of a German king, and handmaid of King Humber; King Locrin fell in love with, and would have married her had he not been betrothed to Guendolœna; however, he kept Estrildis for seven years in a palace underground, and had by her a daughter named Sabrina. After his death Guendolœna threw both Estrildis and Sabrina into the Severn.

Es'tuary, widening mouth of a river of moderate depth where the tides run in from the sea. An estuary is generally formed by the moderate submergence of the lower part of a valley, after which it may be widened by wave and tidal action on its shores, and shoaled by deposition of land waste brought in by rivers and tidal currents. From their shifting bars of sand and mud, estuaries are often difficult to navigate. In them the tides rise rapidly and fall slowly, thus making the period of flood and ebb unequal. The rise of flood tide is sometimes so rapid as to form a wall of water advancing upstream. This is known as a "bore" in the estuary of the Severn, England, as a *mascaret* in the lower Seine, as a *pororóca* at the mouth of the Amazon. Typical estuaries are seen in the lower course of the Delaware and Potomac in the U. S., the Thames and the Firths of Forth and Clyde in Great Britain, and the Elbe and Gironde in Continental Europe.

Etch'ing. See ENGRAVING.

Ete'ocles, mythical king of Thebes (in Bœotia) and a son of Œdipus. He and his brother Polynices agreed to reign alternately over Thebes, but Eteocles usurped the throne when his brother's turn to reign came. The famous expedition of the Seven against Thebes was undertaken to restore Polynices, who killed Eteocles in single combat.

Eter'nal Cit'y, The, Rome, Italy.

Ete'sian Winds, N. and NE. winds which prevail in summer throughout a great part of Europe and in N. Africa. The name occurs in its Greek form in several ancient writers, and is sometimes seen in meteorological works. These winds arise in a great degree from the heat of the African Sahara.

Eth'elbert, d. 616; King of Kent; ascended the throne in 560; became the most powerful prince (*bretwalda*) of the heptarchy abt. 590. His wife, Bertha, a daughter of the King of Paris, was a Christian, and induced Ethelbert and his subjects to profess Christianity, 597 A.D. Ethelbert gave to the Anglo-Saxons their first written code of laws.

Eth'elred, or Æthelred, I, d. 871; Anglo-Saxon King of England; succeeded his brother Ethelbert in 866. In the first year of his reign the Danes conquered a large part of his kingdom; his brother Alfred defeated them in 870. Ethelred was killed in battle with the Danes, and succeeded by Alfred (the Great).

Ethelred II (surnamed THE UNREADY), 968–1016; Anglo-Saxon King of England; son of Edgar. His mother was Elfrida, notorious for her crimes. He succeeded his half brother, Edward the Martyr, 978. In his reign the kingdom was invaded and ravaged by the Danes, to whom he paid large sums of money to purchase peace, but they soon renewed their piratical incursions. The Danish king Sweyn took London in 1014, and Ethelred fled to the court of the Duke of Normandy, who was his wife's brother. He left two sons: Edmund (Ironside) and Edward (the Confessor).

Eth'elwolf, d. 858; Anglo-Saxon King of England; eldest son of Egbert, whom he succeeded in 836. His kingdom was harassed by several incursions of the Danes, who pillaged London in 851. He defeated these invaders at Okely in that year; married, 856, Judith, a daughter of Charles the Bald, King of France; and left four sons: Ethelbald, Ethelbert, Ethelred, and Alfred (the Great).

E'ther, substance, of extreme tenuity and elasticity; assumed to pervade all space, and to be, through its vibrations or wave motions, the medium of the transmission of light and heat. See ATMOSPHERE.

Ether, general name applied to two classes of compounds which are sometimes called simple ethers and compound ethers, though now, more commonly, ethers and ethereal salts. They are usually volatile fragrant substances. Ordinary ether, called sulphuric ether because sulphuric acid is used in its preparation, is the best known ether. It is formed from ordinary alcohol by the action of sulphuric acid. This ethyl ether is a colorless, transparent, and highly mobile liquid, of characteristic odor and taste. Its specific gravity is 0.736, and it boils at 95°. The mixture of its vapor with air is highly explosive. It is a good solvent for resins, fats, alkaloids, and many other classes of carbon compounds. Ether is

much used in medicine and surgery as a diffusible stimulant, and is one of the most widely used and safest of anesthetics. In this latter use it was introduced by Dr. W. T. G. Morton, of Boston, Mass., and was probably the first complete anesthetic ever employed. Ethereal salts, or compound ethers, are analogous to metallic salts, and are formed by the action of an acid on an alcohol, the two reacting in the same way that an acid acts on an ordinary base.

Eth'ics, otherwise called MORAL PHILOSOPHY or MORALS, is the science which treats of the nature and laws of the actions of intelligent beings, considered as to whether they are *right* or *wrong*, *good* or *bad*. The science is more or less closely connected with theology, psychology, politics, political economy, and jurisprudence, but what most strictly belongs to it is the investigation of the principles and basis of duty or the moral law, and an inquiry into the nature and origin of the faculty by which duty is recognized. Various answers have been given to the question why we call an action good or bad, such as that it is consistent or not with the will of God, or with the nature of things, or with the greatest happiness of the greatest number, or that an inward faculty decides it to be such or such; and a great variety of *ethical* systems have been proposed. The foundations of the leading systems were laid in antiquity, the names of Socrates, Plato, Aristotle, Epicurus, the Cynics and the Stoics being especially prominent. The introduction of Christianity brought a new element into ethical speculation, and among Christians ethics were intimately associated with theology, and morality was regarded as based on and regulated by a definite code contained in the sacred writings. The speculations of the Greeks were not, however, disregarded, and some of the ablest Christian moralists (as Augustine, Peter Lombard, Erigena, Anselm, Aquinas, etc.) endeavored to harmonize the Greek theories with the Christian dogmatics.

Most modern ethical systems consider the subject as apart from theology and as based on independent philosophical principles, and they fall into one of two great classes—the utilitarian systems, which recognize as the chief good, happiness, or the greatest possible satisfaction of the tendencies of our nature; and the rationalistic systems, which recognize that ideas of law and obligation can have their source only in reason. The first of the modern school in England was Hobbes, 1588–1679. Among subsequent names are those of Cudworth, Locke, Clarke, Shaftesbury, Butler, Hutcheson, Hume, Adam Smith, Reid, Paley, Whewell, Bentham, J. S. Mill, etc. Among those who maintain the utilitarian theory of morals is Paley, who holds that men ought to act so as to further the greatest possible happiness of the race, because God wills the happiness of men, and rewards and punishes them according to their actions, the divine commands being ascertained from Scripture and the light of nature. Bentham's utilitarianism is considerably different from Paley's. It was entirely dissociated from theology or Scripture, and maintained that increase of happiness ought to be the sole object of the moralist and legislator, pleasure and pain being the sole test of actions. To utilitarianism as a special development belong the later "evolution ethics" represented by Mr. Herbert Spencer, in which biological conceptions, such as "the preservation of the human race," take the place of the Benthamite criterion for determining what is good and bad in actions.

Another theory of ethics places the moral principle in the sentimental part of our nature, that is, in the direct sympathetic pleasure or sympathetic indignation we have with the impulses which prompt to action or expression. By means of this theory, which he treats as an original and inexplicable fact in human nature, Adam Smith explains all the phenomena of the moral consciousness. In considering the systems which recognize that the ideas of law and obligation can have their source only in reason, the question, what is the source of the laws by which reason governs, give rise to a number of psychological theories, among which we may notice Clarke's view of the moral principles as rational intuitions or axioms analogous to those of mathematics; Butler's theory of the natural authority of conscience; the position of Reid, Stewart, and other members of the later intuitional school, who conceives a moral faculty implanted in man which not only perceives the "rightness" or "moral obligation" of actions, but also impels the will to perform what is seen to be right. Very similar, as far as classification goes, is the position of Kant, who holds that reason recognizes the immediate obligation of certain kinds of conduct, and that an action is only good when done from a good motive, and that this motive must be essentially different from a natural inclination of any kind.

Ethio'pia, name given by ancient geographers to the regions situated S. of Egypt and Libya. The name Ethiopians was originally applied by the Greeks to all the peoples who lived in the S. parts of the known world, including the dark-colored natives of India. They supposed Ethiopia to be inhabited by several races called Throglodytes, Pygmies, Macrobii, and Blemmyes. In its extended sense, Ethiopia corresponded to the modern Nubia, Sennaar, Kordofan, and N. Abyssinia. The population of this vaguely defined region was a mixture of Arabian and Libyan races with the genuine Ethiopians. Their language was Semitic. The Nubians and Shangallas of the present time are probably their descendants.

The term Ethiopia proper was restricted to the kingdom of Meroë. The high civilization of Ethiopia was confined to the island of Meroë and *Aethiopia Aegypti*. The capital of this region was Napata, on the Nile. It became one of the most powerful and civilized nations of the world as early as 1,000 B.C.

The military power of the Ethiopians was celebrated by Isaiah and other Hebrew prophets, and sacred history records their invasion of Palestine. In the eighth century B.C. an Ethiopian dynasty (the twenty-fifth) reigned

in Lower Egypt. The first king of this dynasty was Sabaco, whose son and successor, Sebichus (the So or Seva of the Bible), was an ally of Hoshea, King of Israel, 722 B.C. It is stated that in the reign of the Egyptian King Psammetichus, 630 B.C., the military caste, numbering 240,000, migrated into Ethiopia. It was invaded by the army of Cambyses, King of Persia, 530 B.C. According to Josephus, he conquered Meroë. In the reign of Augustus Cæsar, Candace, Queen of Ethiopia, waged war against the Romans, sued for peace, and, 22 B.C., became tributary to him. Early in the fourth century many Christian churches were planted in Ethiopia.

Ethnog'raphy, a description of the human races and peoples. See ETHNOLOGY; MAN.

Ethnol'ogy, the science which treats of the origin and distribution of the races of man and the primitive stages of society. Men are divided into races commonly by physical characteristics, such as the color of the skin, the structure of the hair, the position of the eyes, the prominence of the nose, the shape of the skull, and the proportions of the skeleton. Technology is the branch which treats of the beginnings of industrial arts. The rude implements of chipped or polished stone, which were supplemented by others of wood, bone, horn, skin, sinew, and fiber, belong to what is known as the stone age of savagery, which was succeeded by the bronze and iron ages. Stages of culture are also divided into the hunter stage of lowest savage life, when men obtained food by hunting, fishing, and gathering wild fruits and roots, and clothed themselves in skins; the shepherd stage, when they domesticated animals and began to cultivate the soil; and the artisan stage, marked by division of labor and the exchange of products when "city states" arose, and the way was paved for the growth of invention and the arts of civilization.

Sociology is the branch that treats of the institutions of primitive society, the beginnings of economics, civics, ethics, and jurisprudence. Among the lowest tribes, property, except immediate belongings, which are usually buried with the owner, is owned by the clan or gens. Individual property opens the era of barter, and the invention of money attends the artisan stage of industries. Savage society is organized on the basis of natural kinship, or that of adoption. In the lowest stage kinship is primarily reckoned in the female line, children belonging to the clan of the mother. Clans are grouped into tribes by kinship in the male line and by intermarriage. The transition from savagery to barbarism is marked by the formation of gentes in which descent is traced in the male line. In barbarian society patriarchies spring up, in which the elder holds despotic sway over his descendants and the families of his younger brothers, and controls the property of the gens. In tribal society the members of the clan or gens are obliged to marry outside the clan, but within the tribe. Feudalism and monarchy are natural outgrowths of barbarism. Linguistics treats of languages, an uncertain basis of ethnographic classification, since conquering and conquered peoples or colonists may adopt another language. In savage society a vast number of wholly independent languages are developed, and these coalesce in many cases, and in some become extinct. Esthetology treats of the beginnings of the fine arts. The lowest tribes carved images of men and animals in stone, bone, or wood, mainly for purposes of worship. They also drew pictures to record events, and the picture writings became more and more conventional until ideographic writing was evolved, followed by syllabaries, and finally alphabets. Music in the beginning is purely rhythmic, marking time for the dance.

The study of comparative religions affords strong proof of the psychic identity of mankind. In tribal society every tribe has its own gods, recognizing the right of other tribes to theirs, and cultivates religion for the purposes of preserving health or curing disease and of averting famine and disaster. In the lowest religions, known as animism, mountains, rivers, trees, etc., are supposed to be endowed with mind and powers like those possessed by men. In a more advanced stage the gods have animal forms, and later the heavenly bodies and phenomena of nature are personified and gradually come to preside over human passions and interests, becoming gods and goddesses of war, love, vengeance, agriculture, etc. Remains have been found that connect man with a former geological period—that of the mammoth and the cave bear. His original habitat is conjectured to have been on the shores of the Mediterranean or in W. or Central Asia or by some in a region now depressed beneath the Indian Ocean. Ethnologists differ greatly in their classification of the races or varieties of man. Blumenbach distinguished the Caucasian, Mongolian, Ethiopian, Malay, and American races. Quatrafages recognized only the Caucasian, Mongoloid, and Negroid. Müller adopted the hair as the most persistent character, and divided races according as they had straight hair or curly hair, either wooly, kinky, or tufted. Huxley distinguished between the smooth-haired Australoids, Mongoloids, and Whites, the latter divided into blonds and brunettes, and the wooly haired. Others have regarded the now predominant brunette whites as of mixed blood. Brinton, recognizing geographic barriers, distinguished five main stocks, the European, African, Mongolian, American, and Oceanic. Keane divided mankind into the Ethiopic, Mongolic, American, and Caucasis, the black, yellow, red, and white races. Many make the American red race an offshoot of the Mongoloid. Deniker makes prominent physical characters the basis of division. The Negrito, Negro, and Melanesian peoples have wooly hair and broad, flat noses; the Ethiopian, Australian, Dravidian, and Assyroid, curly hair; the Arab, Littoral European, Ibero-Insular, W. European, and Adriatic, wavy hair with black eyes; the Aino, Polynesian, Indonesian, and S. American, straight or wavy hair and black eyes; the N. American, Central American, Patagonian, Eskimo, Lap, Ugrian, Turco-Tatar, and Mongol, straight hair.

Ethylene (ĕth'ĭl-ēn), **Ole'fiant Gas, or Bicar'bureted Hy'drogen,** gas produced by heating alcohol with strong sulphuric acid or boric anhydride; also by dry distillation of many organic bodies, as fats, resins, wood, coal, many salts of organic acids, etc. It is a constituent of coal gas, the illuminating power of which is largely due to its presence. It is colorless, and burns in the air with a bright white flame, which is very luminous. Its compound with chlorine is known as "Dutch liquid."

Etiola'tion, state of a plant deprived of green color by the exclusion of light. When it is obtained by keeping plants in the dark, in order to render them tender and less acrid, as in the case of celery, the process is called blanching (*q.v.*).

Et'ive, Loch, salt-water lake or inlet of the sea in the county of Argyle, Scotland; is 20 m. long, and varies in width from ½ to 3 m. It receives the Awe River, and communicates with the Firth of Lorn. Grand and romantic scenery occurs along its banks.

Et'na, volcanic mountain of Sicily; in the NE. part of the island, near the sea and the city of Catania; is an isolated mass of conical form, having no connection with other Sicilian mountains; has an altitude of 10,935 ft. above the sea level, and its base is about 90 m. in



ETNA.

circumference. The volcanic phenomena, which it presents on a greater scale than is elsewhere seen in Europe, early attracted the attention of the ancients. Thucydides states that an eruption occurred, 425 B.C. It is recorded that four violent eruptions occurred in a period of twenty years, *viz.*, 140, 135, 126, and 121 B.C. The city of Catania has repeatedly been nearly ruined by the eruptions and earthquakes.

E'ton, town of Buckingham, England; on the Thames, opposite Windsor; 22 m. W. of London: is the site of Eton College, one of the most famous educational institutions of England, founded and endowed, 1440, by Henry VI, although the buildings were not completed until 1523. It is a favorite school of preliminary instruction for the sons of the nobility and gentry.

Etru'ria, or Tus'cia, important country of ancient Italy; called Tyrrhenia by the Greeks; bounded N. by the Apennines, E. by the Tiber, and W. by the Mediterranean or Tyrrhenian Sea. The inhabitants were called Etruscans (*Etrusci*) and Tuscans (*Tusci*). In the Etruscan language, *Rasena.* The chief rulers bore the general title of *lucumo.* There were twelve cities which formed a league or federation of Etruria proper. Among the most important were Tarquinii, Veii, Clusium, Volsinii, Cortona, Cære, Perusia, Arretium. Livy states that before the Romans became the dominant people of Italy the power of the Tuscans was widely extended both by sea and land.

Besides these twelve cities the Etrurians possessed another state or confederacy on the N. side of the Apennines. According to Roman traditions, the Tuscans were a powerful nation before the foundation of Rome, 753 B.C. It probably attained its greatest power about one hundred and fifty years later. Tradition indicates the establishment of an Etruscan dynasty at Rome under the two Tarquins, and assigns to this period of Etruscan domination the construction of the Cloaca maxima and the Capitol. Abt. 508 B.C., Porsena, King of Clusium, marched against Rome, and, as the best critics believe, captured it. Abt. 309 the combined forces of several Etruscan cities were defeated by Fabius Maximus in a battle which gave the first decisive blow to their power. The conquest was completed by the Romans in 283 B.C. They were admitted to the Roman franchise 89 B.C.

Ancient writers concur in representing the Etruscans as the most cultivated people of ancient Italy, they were especially skillful in ornamental and useful arts, in which their ideas and patterns singularly resemble those of Egypt. The Romans derived from them many arts and inventions. The Etruscans excelled in agriculture, navigation, engineering, and in useful public works.

Et'trick, pastoral vale in Selkirk, Scotland; extends along the Ettrick River, which, after a course of 28 m., enters the Tweed 2 m. below Selkirk. It is remarkable for beautiful scenery. Ettrick Forest, a royal hunting tract, included all Selkirk. It is nearly divested of trees. James Hogg, the poet, called the "Ettrick Shepherd," was born in the vale and parish of Ettrick.

Et'ty, William, 1787–1849; English figure painter; b. York; Royal Academician, 1828. He painted the nude successfully. His pictures are agreeable in color. "Head of a Cardinal" is in the South Kensington Museum; four works, including "Bather," in the National Gallery, London.

Etymol'ogy, that department of grammar which deals with the history of individual words, both as to form and meaning. In the com-

mon usage, the term is applied to the modifications in the form of words, *i.e.*, with inflexion and derivation. The etymology of scientific grammar seeks to reconstruct the primitive form and meaning of words by tracing their earlier forms and values and by comparison of cognate languages or dialects, or at least in case of later formations to determine their connection as derivatives or compounds with primitive word forms or with groups of word forms united severally in the possession of a common element known as the root. Prior to the establishment in the nineteenth century of comparative philology, and the critical study of Sanscrit, etymology was little better than learned guesswork. It relied merely upon striking resemblances of form or meaning, and lacked the restraints of critical tests. With the progress of the science the tendency has been to apply with increasing rigidity the tests of phonetic law, which seems to offer the only safe basis for estimating the correctness of an etymology.

The natural tendency of the mind to associate resemblance of signification with resemblance of form in words produces folk etymology. This association betrays itself most commonly in changes of form, accommodating the word to its presumed etymon, as *female* for *femele* (cf. *male*), *sparrow grass* for *asparagus*, but also in mental groupings, such as *cutlet* with *cut*. This etymology of a word even when certainly known is not directly applicable in determining the form or use of that word in current speech. The earlier meaning of the word is no "truer" than the later. Etymology is not, as the ancients thought and as its name implies, a search for the "true" meaning, but for the *history* of meaning and use as well as form. The information conveyed by an etymology is therefore to be historically and not directly applied. It shows how a word has come to be what it is, and makes it intelligible in its historical relations and according to the creative conditions of its existence. See LANGUAGE.

Eu, Prince Louis Philippe Marie Ferdinand Gaston d'Orléans (Comte d'), 1842– ; French military officer; b. at the Château of Neuilly; eldest son of the Duc de Nemours, and a grandson of Louis Philippe, king of the French. In 1864 he married Isabella, daughter of Dom Pedro II, Emperor of Brazil. As marshal of the empire he took command of the allied forces operating against Paraguay. He was commander general of the Brazilian artillery, 1865–89, but when the revolution of 1889 deposed Dom Pedro, Comte d'Eu accompanied him to Europe, and afterwards resided at Versailles, France. His son, Prince Louis, was excluded from Brazilian territory, 1907.

Eubœa (ū-bē'ū), or **Ne'gropont,** Greek island; the largest island in the Ægean Sea; is about 90 m. long; greatest breadth about 30 m.; area, 1,574 sq. m.; with the Sporades islands (forming a nomarchy of Greece), 2,216 sq. m. The surface is mountainous. The soil of the valleys produces cotton, wheat, grapes, etc. Among the exports are wool, hides, and oil. The chief towns are Chalcis and Carystus. In ancient times Eubœa belonged to the Athenian republic.

Eucalyp'tus, genus of trees of the myrtle family, comprising a hundred or more species, mostly natives of Australia. They form a characteristic feature of the vegetation of Australia, having entire leathery leaves, of which one edge is directed toward the sky, so that both surfaces are equally exposed to the light. The eucalypti exude resinous juices, and therefore are called gum trees. The timber is excellent, and is used for shipbuilding, etc. The bark



EUCALYPTUS MACROCARPA.

of several species abounds in tannin, and is used for tanning. The *Eucalyptus resinifera*, which grows to a great height, yields a red astringent gum, which is called "Botany Bay kino," and is used in medicine as a substitute for kino. The medicine eucalyptus is especially useful in cases of catarrh, and is inferior only to quinine in malarial poisoning. Several species of eucalyptus, especially that known as Blue Gum, have been successfully introduced into California and Europe. Eucalypti are often planted in swamps and malarial districts to drain and render them more healthy.

Eu'charist (Greek EUCHARISTIA, "the giving of thanks"), name applied to the sacrament of the Holy Communion, or the feast of the Lord's Supper, in allusion to the blessing and thanksgiving with which the last supper of Christ with his disciples began and ended. This solemn festival has been kept in all Christian churches from the time of the resurrection, in commemoration of the passion and death of Christ, and in obedience to his precept. Among the earliest disciples in Judea, the Lord's Supper seems to have been a regular meal, probably the principal meal of the day in each family, into which the commemorative breaking of bread and partaking of the cup of blessing were introduced. Later the disciples of many families came together and held a festival in common, a practice in which originated the *agape*, or love feast, in the course of which the brethren saluted each other with a holy kiss. The abuses which grew out of this, and which

are severely rebuked by St. Paul in I Cor., led to a separation of the two institutions; and the commemorative observance has since been celebrated solemnly apart from any feast. For the Roman Catholic doctrine on Eucharist, see MASS.

Euchlo'rine, green gas liberated when potassium chlorate is acted on by hydrochloric or sulphuric acid; possesses bleaching properties. It is prepared by heating gently a mixture of two parts of sulphuric acid, two of water, and one of chlorate of potash, and is a mixture of chlorine dioxide and chlorine.

Euchre (ū'kẽr), game of cards, usually played by two or four persons with a pack from which all the cards from two to six inclusive (sometimes seven and eight) have been withdrawn. The dealer distributes five cards to each player, beginning at the left, giving first two and then three, and turns up one for the trump. The cards have the same relative value as in whist, except that the knave of trumps, called the right bower, is the highest card in the pack, and the other knave of the same color, called the left bower, the next highest; after which comes ace, king, etc. Players must in all cases follow suit, and the left bower is invariably considered a trump. The game consists of five points. If the player make three tricks, he scores one point; if all, two points; but if he fails to make three tricks, he is "euchred," and his adversary scores two points.

Eu'clid (of ALEXANDRIA), Greek mathematician, called the "father of geometry"; b. Alexandria; lived abt. 300 B.C., and is said to have belonged to the Platonic school of philosophy; he taught mathematics in the reign of Ptolemy I (Soter), who died abt. 282 B.C. Euclid made important discoveries in geometry, and surpassed all preceding geometers in the rigorous method and arrangement of his demonstrations. When Ptolemy I asked him if geometry could not be mastered by an easier process than the ordinary one, he returned the celebrated answer, "There is no royal road to geometry." His "Elements of Geometry" presents the most ancient system of that science that is extant, and has been a standard work for 2,000 years.

Euclid (of MEGARA), Greek disciple of Socrates; flourished abt. 400 B.C.; said to have witnessed the death of Socrates (399 B.C.), after which he founded at Megara a school called the Megaric or Dialectic. His system was based on or partly derived from the principles of the Eleatic school, to which he added the ethics of Socrates.

Eudiom'eter, instrument invented by Priestley for determining the proportion of oxygen in the air; others have since been invented for estimating oxygen in gaseous mixtures, and the name is retained for these. In the application of the instrument, the gas is made to unite with some substance, as phosphorus, introduced into the gaseous mixture, which is contained in the upper end of a graduated glass tube inverted over mercury. The diminution of bulk caused by the absorption of the oxygen indicates its quantity.

Eudo'cia, or Eudox'ia, abt. 393–460; Byzantine empress; b. Athens; wife of Theodosius II, Emperor of the East; daughter of the sophist Leontius; name, before her conversion to Christianity, Athenaïs; made an ostentatious pilgrimage to the Holy Land, 438. She supplanted the emperor's sister, Pulcheria, in the administration of the government, and sided against her in the Eutychian controversy; for this and because of jealousy the emperor banished her, 449. Settling then in Jerusalem, she devoted herself to the study of Christian theology and to religious exercises; wrote paraphrases in heroic verse of the Octateuch, Daniel, and Zechariah, a poem on the martyrdom of Cyprian, etc.

Eudox'us, Greek astronomer; b. at Cnidos, Caria; flourished abt. 366 B.C.; opened a school at Athens or Cnidos; computed the length of the year to be 365¼ days, and appears to have originated a doctrine of concentric solid crystalline spheres, by which he explained the apparent motions of the sun, moon, and planets.

Eugène', Prince (FRANÇOIS EUGÈNE DE SAVOIE), 1663–1736; Austrian military officer; b. Paris; son of Prince Eugène Maurice de Savoie-Carignan, Count of Soissons; entered the service of the Emperor of Austria, 1683; fought against the French and the Turks, gaining, as commander of the army in Hungary, a decisive victory over the latter at Zenta, 1697; during the war of the Spanish Succession he invaded Italy, defeated the French Marshal Catinat at Carpi, and Marshal Villeroi at Chiari, 1701; was president of the Council of War in Vienna, 1702; commanded the imperial army which coöperated with the English under Marlborough, and defeated the French and Bavarians at Blenheim, 1704. He was defeated by the Duke of Vendôme at Cassano, Italy, 1705, but gained a victory over the Duke of Orleans at Turin, 1706, and expelled the French from Italy; became associated with Marlborough in command of the allied armies in Flanders, which gained the victory at Oudenarde (1708), and claimed that at Malplaquet (1709). Austria having been induced to sue for peace, Eugène signed the Treaty of Rastadt, 1714. In 1716 he defeated the Turks at Peterwardein, and in 1717 captured Belgrade from the same enemy. After the end of this war (1718), he rendered Austria important services as a statesman.

Euge'nia, a genus of trees and shrubs of the family *Myrtaceæ*; comprises numerous species, which are natives of tropical and subtropical countries, and some of them produce delicious fruits remarkable for their pleasant balsamic odors. The fruit is a berry of one or two cells, with one seed in each cell. The *Eugenia malaccensis,* a native of the Malayan Archipelago, is a small tree which bears a red fruit nearly as large as an apple, with a juicy pulp and an agreeable odor like that of a rose; hence it is called rose apple. The last name is also applied to the fruit of the *Eugenia jambos,* an

E. Indian tree, now cultivated extensively in many tropical countries. Florida has five or more unimportant species.

Eugénie (ō-zhā-nē'), or **Eugénie Marie' de Montijo** (mōn-tē'hō), 1826– ; ex-Empress of the French; b. Granada, Spain; daughter of the Spanish Count of Montijo, and Maria Manuela Kirkpatrick, who was of Scottish extraction. Eugénie was styled the Countess of Teba in her youth. She was married to Napoleon III, January 30, 1853, and bore a son, March 16, 1856. As a zealous Romanist she used her influence to promote the power of the pope. She acted as regent, 1859, when Napoleon was in Italy, in 1865 during his Algerian tour, and again in the interval between his departure for the seat of war, July 23, 1870, and the proclamation of a republic by the people of Paris, September 4, 1870. She then escaped to England, and resided at Chiselhurst, afterwards removing to Farnborough. She wrote "Some Recollections from My Life."

Euge'nius IV (GABRIELE CONDOLMIERI), 1383–1447; pope; b. Venice; succeeded, 1431, Martin V, who had convoked a council at Basel. This council refused to recognize the supremacy of the pope. Eugenius therefore issued a bull proclaiming that the Council of Basel was or must be dissolved, and called another council at Ferrara, 1438. The Council of Basel in 1438 deposed the pope, and elected as his successor Amadeus of Savoy, who took the name of Felix V. The result of this election was a schism in the Church, for Eugenius continued to act as pope in Rome, and was recognized by several states. In 1439 the sessions of the council were transferred to Florence, and Eugenius and John Palæologus signed a convention for the union of the Greek and Latin churches.

Eugubian (ū-gū'bĭ-ăn) **Tables**, certain bronze tablets found near Gubbio (the ancient Iguvium), 1444. Five of the inscriptions are in Etruscan and Umbrian characters, the other two in Latin. They were published by Lepsius in his "Inscriptiones Umbricæ et Oscæ," and contain the acts of a corporation of priests.

Euhem'erus, Greek philosopher of the third century B.C.; the founder of Euhemerism, or that principle of interpreting the pagan mythology according to which each myth is supposed to have originated from some simple historical event. This method of interpretation, which earned for the author the surname "Atheist," was introduced into Rome by Ennius, and eagerly employed by the Fathers of the Church to discredit pagan mythology.

Eulenburg (oi'lĕn-bŏrkh), **Friedrich Albrecht** (Graf von), 1815–81; Prussian statesman; went, 1859, as envoy to China, Japan, and Siam; concluded a treaty of amity and navigation with Japan, 1861, and in September, 1861, another with China; became Minister of the Interior in 1862.

Eulenspiegel (oi-lĕn-spē'gĕl), **Till**, "owl-glass," name associated in Germany with many comical tales and amusing pranks, probably originated with a peasant who died 1350, and whose adventures were published abt. 1483–1500. These tales were at first rather coarse, but were much improved by Fischart, in 1572, since which time many editions of them have been published.

Eu'ler, Leonard, 1707–83; Swiss geometer; b. Basel; in 1733 he became Prof. of Mathematics in the Academy of St. Petersburg. It is said that he wrote more than half of the forty-six quarto volumes published by the Academy between 1727 and 1783. Invited by Frederick the Great, he removed to Berlin, 1741. He improved the integral calculus and the whole science of mechanics. Among his numerous works are "Mechanics, or the Science of Motion Analytically Explained," a "Treatise on Naval Science," "Treatise on Integral Calculus," a "Treatise on Dioptrics," and "Theory of the Moon's Motion."

Eu'menes, d. abt. 316 B.C.; favorite officer of Alexander the Great; b. Cardia, Thrace; had a high command in the army which Alexander conducted against Persia, 334 B.C., and gained the confidence of that prince; on the death of Alexander, became governor of Cappadocia and Pontus. As an ally of Perdiccas he defeated Craterus, 321, soon after which Antigonus and Antipater formed a coalition against him. Eumenes was captured and put to death by Antigonus.

Eumen'ides (*i.e.*, "the gracious ones," so called to propitiate them), or **Erinyes**, Greek name of the Furies, whom the Romans called Furiæ or Diræ. They were supposed to be goddesses who punished crimes and pursued the guilty with burning torches. According to the later tradition, there were three Furies, *viz.*, Tisiphone, Alecto, and Megæra.

Eumol'pus, in Greek mythology, a Thracian bard, son of Neptune, and the founder of the Eleusinian mysteries. Musæus is said to have had a son named Eumolpus, who was an instructor of Hercules.

Euno'mius, d. abt. 393 A.D.; founder of an Arian sect called Eunomians; b. Dacora, Cappadocia; was appointed Bishop of Cyzicus, 360 A.D. by Euxodius, Bishop of Antioch, who four years afterwards deposed him for heresy. Eunomius maintained the extreme Arian doctrines. For him Christ was neither of the same nor like substance with the Father, but essentially and substantially different. For his peculiar teaching, he was several times banished. His followers, the Eunomians, were for some time very numerous, but the sect died out in the fifth century.

Eunuch (ū'nŭk), originally, a servant who had the care of bedchambers; hence, from the custom of placing women's apartments under the care of castrated males, the word means such a person. In Rome under the emperors many eunuchs were kept. It is asserted that they existed in considerable numbers in mediæval Europe. In Italy they were esteemed for their fine soprano singing. Leo XIII is said to have effected their banishment from the papal choir, where they were employed long

after they had disappeared from the operatic stage. At present they are chiefly found in Mohammedan countries, and are said to come mostly from the NE. part of Africa. Eunuchs as a class are small, beardless, and weak, of a jealous and intriguing character; yet some, like Bagoas, the Persian minister; Philetærus, King of Pergama, and Narses, the Byzantine general, have possessed energy and ability. As used in the Bible and the classics, the word often means simply a chamberlain.

Eupato'rium, a genus of plants of the Composite family, having the florets all tubular and perfect; comprises many species of perennial herbs, mostly American. The species



Joe-Pye Weed (Eupatorium purpureum).

called boneset or thoroughwort is a native of the U. S., and is used as a tonic, stimulant, and sudorific. The hemp agrimony, which grows wild in England, has been used in medicine. The *E. purpureum* and several other American species appear to have diuretic properties.

Eu'phemism, figure in rhetoric by which an unpleasant idea is expressed by indirect and milder terms. The euphemisms of the ancients generally originated in a desire to deprecate the ill will of malevolent powers by attributing to them characteristics opposite to those which really belonged to them. Thus the Furies were by the Greeks termed Eumenides, "gracious ones."

Euphor'bia, a genus of plants of the spurgewort family, having an acrid milky juice. More than 100 species of this genus are natives of the U. S. The seeds of "caper spurge" of Europe and the U. S. yield the fixed oil known as oil of euphorbia, a cathartic. Some African euphorbias are large trees. Some species are cactuslike in appearance, and are popularly classed with them, *e.g., Euphorbia*



Euphorbia officinarum.

splendens, a fleshy, prickly plant of the greenhouses. *E. pilulifera* is used in the treatment of asthma.

Euphor'bium, acrid and inodorous gum resin produced by the *Euphorbia officinarum* of S. Africa and some other species, including *E. canariensis* of W. Africa, and *E. antiquarum* of the Levant. It is a violent emetic and purgative, and is sometimes used in the composition of plasters and in veterinary medicine.

Eupho'rion, Greek poet and grammarian; b. Chalcis in Eubœa; flourished abt. 250–220 B.C.; became librarian to Antiochus the Great, and produced epic poems and elegies besides several prose works, all of which have perished.

Euphra'nor, Greek painter and sculptor; b. Corinth; flourished abt. 350 B.C., a contemporary of Apelles; excelled in both painting and sculpture. Among his works was a painting of Ulysses in his feigned insanity.

Eu'phrasy, or **Eye'bright,** plant of the figwort family, the *Euphrasia officinalis,* a small annual herb from 2 to 8 in. high, a native of Asia, Europe, and N. America. Milton in his "Paradise Lost" speaks of its virtues in clearing the eyesight. Some varieties are said to have in their blossoms a spot or "signature" resembling the eye, and this spot caused, or at least strengthened, the popular faith in its powers.

Euphra'tes, large river of W. Asia; rises in Armenia, in the Anti-Taurus Mountains, by two branches—the Moorad and Kara-Soo. The stream formed by this junction flows first SW., effects a passage through a defile of Mount Taurus, and forms the boundary between ancient Syria and Mesopotamia. After crossing the thirty-sixth parallel of N. latitude it pursues a general SE. direction, flows through the extensive alluvial plains of Babylonia and Chaldea, and enters the Persian Gulf at its

NW. extremity; total length, 1,750 m. From Babylon to the sea, 450 m., it is navigable. Its principal affluent, the Tigris, is nearly as large as the Euphrates itself. The width in some places is nearly 600 yds. The melted snows of the mountains of the Taurus and Anti-Taurus cause a periodical inundation of the Euphrates in the spring. In ancient times the chief city on its banks was Babylon.

Euphros'yne, in Greek mythology, one of the three Graces; a personification of the genius of mirth or joy. See GRACES.

Eu'phuism, affected style of speaking and writing which became a fashion in the reign of Queen Elizabeth. The term originated in the title of a pedantic romance called "Euphues" (1580), written by John Lilly (Lyly) and abounding in antithesis, alliteration, and illustrations drawn from a fabulous natural history.

Eu'polis, Greek comic poet of the fifth century B.C.; in wit and grace second only to Aristophanes, if second even to him. A friend and collaborator of the latter, he took part in the composition of the "Knights," but the poets soon quarreled, and accused each other of plagiarism. Alcibiades was one of the chief targets of his satire, and it was fabled that he took vengeance on the poet for his "Dunkards" by drowning him. No fewer than seven of his pieces, out of no more than seventeen, received the first prize.

Eura'sia, the continent comprising Europe and Asia, which commonly are separately termed continents.

Eura'sians, or **Half'castes,** offspring of European fathers and Asiatic mothers. The term is properly restricted to East India, where persons of this class are especially numerous in the large cities. They generally receive a European education. The girls are sometimes very beautiful, while the young men enter the government offices or serve as clerks with merchants. The Europeans, who also call them "Vepery Brahmins," do not hold them in high estimation. The natives call them "Cheechee."

Eure'ka (Greek, "I have found it"), exclamation of Archimedes when, after long study, he discovered a method of determining the amount of alloy in King Hiero's crown. Hence the word is used as an expression of triumph at a discovery or supposed discovery.

Eu'ric, abt. 420–84; King of the W. Goths (Visigoths); gained possession of the crown by killing his brother, Theodoric, 466; consolidated the W. Gothic Empire in Gaul by subjugating the whole region between the Rhone, the Loire, the ocean, and the Pyrenees; then sent Gotheric into Spain, and in a short time the Romans were expelled and the whole peninsula was brought under the sway of the W. Goths, with the exception of the small Suevic kingdom in Lusitania.

Eurip'ides, abt. 480–406 B.C.; one of the three great tragic poets of Greece; b. Salamis; son of an Athenian citizen; in his boyhood took part in religious festivals as a dancer and torch bearer; at twenty-five produced the "Peliades," the first of his plays, which was acted, and received the third prize; spent the close of his life at the court of Archelaus of Macedon, and there died. Of ninety-two dramas, or twenty-three tetralogies (*i.e.*, series of four), ascribed to him, nineteen plays have been preserved, one of which, "Rhesus," is of doubtful genuineness. These, alphabetically arranged are: "Alcestis" (438) strictly speaking a substitute for a satyr drama, transcribed by Browning in "Balaustion's Adventure"; "Andromache," "Bacchæ," a posthumous play, considered a sort of poetical deathbed repentance; "Cyclops," "Electra," "Hecuba," "Helena," "Heracleidæ," "Hercules Furens" (translated by Browning in "Aristophanes's Apology"), "Hippolytus" (428), emulated by Racine in his "Phèdre"; "Ion," "Iphigenia in Aulis," "Iphigenia among the Taurians," made additionally famous by Goethe's "Iphigenie"; "Medea" (431), which with the "Hippolytus" forms the double summit of Euripidean art; "Orestes," "Phœnissæ," a remarkable accumulation of tragic scenes; "Rhesus," "Supplices," "Troades." Euripides found less favor with the Athenian people than did Æschylus and Sophocles. He did not win his first victory until the year 441, and received the first prize only five times. He was bitterly opposed by Sophocles and Aristophanes, the latter's "Frogs" being a satirical indictment of the poet's art and his moral teaching.

Euroc'lydon, violent wind of the Mediterranean mentioned in Acts xxvii, 14. The Vulgate renders it *euro-aquilo, i.e.*, NE. wind, but in some of the best manuscripts the reading indicates an ENE. wind.

Euro'pa, in classic mythology, a daughter of Agenor, King of Phœnicia, and a sister of Cadmus. According to a poetic legend, Jupiter, in the form of a bull, carried her on his back to Crete, where he assumed human form and won her love. She bore by him Minos, Sarpedon, and Rhadamanthus.



EUROPA. FROM AN OLD COIN.

Eu'rope, one of the four great continents; area about 3,781,647 sq. m.; bounded N. by the Arctic Ocean, E. by Asia, SE. by the Caspian, S. by Asia, the Black Sea, and the Mediterranean, and W. by the Atlantic; greatest breadth about 3,400 m.; extent from N. to S., 2,400 m. at the extreme points. Great Britain and Ireland rank as a part of Europe, having been separated from the continent at no very remote geological period. In the N., Iceland and Nova Zembla, and in the Mediterranean, Corsica, Sardinia, Sicily, Malta, Crete, the Ionian and the Balearic Islands also belong to Europe. The length of coast line is about 20,000 m., 8,000 of this being on the Atlantic, 3,600 on the Arctic Ocean, and 7,800 on the Mediterranean and Black seas. Its three great


EUROPE
SCALE OF MILES
0 50 100 200 300 400
ARCTIC OCEAN
ATLANTIC OCEAN
Norwegian Sea
North Sea
Baltic Sea
BLACK SEA
CASPIAN SEA
MEDITERRANEAN SEA
Ionian Sea
Bay of Biscay
ICELAND
BRITISH ISLES
ENGLAND
WALES
FRANCE
SPAIN
PORTUGAL
DENMARK
GERMAN EMPIRE
AUSTRIA
HUNGARY
RUSSIA
SIBERIA
TURKESTAN
PERSIA
ASIA
AFRICA
St. Petersburg
Moscow
Stockholm
Copenhagen
Naples
Rome
Algiers
Arabia
Mesopotamia
Euphrates
Volga


MAP OF
SOUTHEASTERN
EUROPE
SCALE OF MILES
0 25 50 100 150 200
AUSTRIA
HUNGARY
SERVIA
BULGARIA
RUMELIA
ROUMANIA
RUSSIA
ASIA
TURKEY
GREECE
CRETE
CANDIA
AFRICA
ITALY
SWITZERLAND
ADRIATIC SEA
TYRRHENIAN SEA
MEDITERRANEAN SEA
IONIAN SEA
LIGURIAN SEA
AEGEAN SEA
BLACK SEA
SEA OF MARMORA
Rome
Venice
Vienna
Budapest
Belgrade
Bukharest
Sofia
Constantinople
Athens
Smyrna
Odessa
Trieste
Naples
Palermo
Malta
Tunis
Marseilles
Lyons
Turin
Milan
Genoa
Florence
Corsica
Sardinia
Sicily
Rhodes
Crete
Long. 16° East from 18° Green.
BUNNAY & CO., N.Y.

S. peninsulas—Italy, the Greco-Balkan Peninsula, and the Iberian Peninsula of Spain and Portugal—form marked features of its topography.

The leading physical features are the mountainous region in the S. and the low district in the N. and E. The central mountain system is the Alps, which extend in a great arc of about 700 m. along the frontiers of Italy and France, through Switzerland and the portions of the Austrian Empire, and along the border of S. Germany. They culminate in Mont Blanc, 15,779 ft., the highest point in Europe (if we exclude the Caucasus). N. and E. of the Alps are the Jura, Vosges, Black Forest, Sudetic, Carpathians, and other ranges. Westward the Cevennes and other mountains of S. France form connecting links between the central highland region and the Pyrenees. The lowlands comprise large portions of W. and N. France, Belgium, the Netherlands, Denmark, N. Germany, Galicia, and Russia. The principal rivers are the Danube, Volga, Ural, Dnieper, Don, Neva, Petchora, the two Dwinas, Niemen, Oder, Rhine, Elbe, Vistula, Po, Tagus, Duero, Ebro, Guadalquivir, Loire, Garonne, Rhone, Seine, Thames, Severn, Humber. The Volga drains 500,000 sq. m. of Russian territory, and the Danube has a basin estimated at 300,000 sq. m. Europe abounds in lakes—Lake Ladoga, in Russia, being the largest. Minor lakes, celebrated for their beauty, are Geneva, Maggiore, Garda, Como, Neufchâtel, Constance, Zurich, and Lucerne.

Owing to the numerous small lakes, the Mediterranean, the large water surface penetrating and hemming in the continent, and the proximity of the Gulf Stream to its W. coast, Europe has a climate far more moist than that of America or Asia. The temperature of any given parallel of latitude in the greater part of Europe is several degrees warmer than the regions of the same latitude in America. The whole of Europe belongs to the temperate zone, except the small portion extending into the N. frigid zone. The rainfall occurs most largely in the winter in S. Italy and Spain; autumn and spring are the rainy seasons in N. Spain and Italy and S. France. Summer brings a rainy season to Switzerland, Germany, Austria, Prussia, and Sweden. The British Islands have their maximum rainfall in winter. W. Europe has heavier rains than E. The snow line in the mountains varies from 8,000 to 10,000 ft. above the sea among the Alps, while in Norway the snow line comes down to the altitude of 2,360 ft.

Of the cereal crops, wheat is heavily grown in Russia, Austria, France, England, Germany, and the countries of the Danube. Barley is an almost universal crop; maize or Indian corn is largely cultivated in the S., as is also the potato; rye and oats are grown throughout central and N. Europe, and beans, peas, clover, lucern, sainfoin, hemp, flax, etc., are grown profusely. The cultivation of the vine is a great industry in France, Italy, Austria, and Spain. The olive flourishes in Italy, Greece, Spain, and Portugal. Tobacco is grown all the way from Sicily to Sweden. The beet is cultivated in central Europe for its sugar. The timber trees, oak, chestnut, beech, ash, alder, birch, pine, elm, maple, poplar, hemlock, and fir, though greatly depleted by centuries of consumption, still furnish forest products for fuel and the arts. Mineral wealth abounds, though for gold and silver Europe depends mainly on other lands. Mines of iron ore, lead, copper, coal, and salt are extensively worked. Europe abounds in mineral springs of great variety and chemical virtue.

The inhabitants of Europe embrace many composite races. The great Aryan race historically predominant in Europe, came in at an uncertain period, probably by way of Asia Minor. About sixty distinct languages are now spoken in Europe; most of these are of the Aryan family, including the Hellenic, Italic, Celtic, Teutonic, Slavonic, and Lettish branches. The Semitic branch includes the Hebrew, Arabic, etc., and the Tartaric, the Turkish, Magyar, Lapponic, and many other dialects. Recent changes in the political map of Europe have left its principal divisions as follows: four empires, thirteen kingdoms, four republics, three principalities, and one grand duchy.

Countries.	Government.
Andorra	Republic.
Austria-Hungary	Empire.
Belgium	Kingdom.
Bulgaria	Kingdom.
Denmark	Kingdom.
France	Republic.
Germany	Empire.
Great Britain and Ireland	Kingdom.
Greece	Kingdom.
Italy	Kingdom.
Lichtenstein	Principality.
Luxemburg	Grand Duchy.
Monaco	Principality.
Montenegro	Principality.
Netherlands	Kingdom.
Norway	Kingdom.
Portugal	Kingdom.
Roumania	Kingdom.
Russia	Empire.
San Marino	Republic.
Servia	Kingdom.
Spain	Kingdom.
Sweden	Kingdom.
Switzerland	Republic.
Turkey	Empire.

Education is compulsory in almost all the nations (Russia, Turkey, Belgium, and the Netherlands being the chief exceptions); but in Italy, Spain, and others of the S. countries the compulsory law is not strictly enforced. Paganism has but little foothold in Europe, which is preëminently Christian, and includes the Roman Catholic Church, the Greek or E. Church, and the Protestant Church. Roman Catholicism predominates, especially in Austria, France, Italy, Belgium, Spain, and Portugal. There are several millions of Mohammedans, mostly in Turkey, Russia, and Bulgaria. There are also several millions in Austria-Hungary belonging to the Greek Oriental Church, and in France about 7,000,000 who refuse to make a statement of religious belief.

The authentic annals of Europe commence with those of Greece; that country fell under the dominion of Macedon and then of Rome. In the time of Augustus the Roman Empire embraced modern France, Belgium, Spain, Por-

tugal, W. Germany, Switzerland, Italy, much of the Austrian Empire, Servia, Turkey, and Greece. When Constantine established the seat of government at Byzantium (now Constantinople), and made Christianity the religion of his empire, his territorial outlines were nearly the same, with the addition of Britain. Gradually the German race became ascendant. Angle, Saxon, and Jutish kingdoms were established in England; a W. Gothic kingdom was founded in Spain; the Franks and Burgundians formed monarchies in France and central Europe; the E. Goths, and after them the Lombards, ruled in Italy. Somewhat later came the great Slavic influx into SE. and E. Europe. The Saracens attacked the S. in the seventh century, and held a great part of Spain for centuries.

During the Middle Ages feudalism and chivalry were developed. The papal power of Rome became dominant, and the Eastern and Western churches were separated. The great crusades were undertaken, and the Turks overthrew the Eastern Empire, 1453. The close of the Middle Ages was signalized by that revival of learning and art known as the Renaissance, and by the development of parliamentary institutions in England. In the fifteenth century the new trade routes led to the decline of such powers as the Hanse cities, Venice, etc., and the rise of Spain and Portugal. The sixteenth century was marked by the Reformation, and by the extension of the empire of Charles V over the Netherlands, Spain, Naples, and the German states, leading to wars and rivalries which lasted for generations. Religious wars in France between the Catholics and Huguenots resulted in the final triumph of the former, while Germany was desolated by the politico-religious Thirty Years' War of 1618–48. In the seventeenth century a prolonged struggle in England ended in favor of constitutional government; the same period on the Continent saw Spain displaced by France as the great military power. In the eighteenth century Russia and Prussia rose to the rank of great powers, and Sweden sank from that position; England and France carried on a rivalry for expansion; Poland disappeared from the map, and Turkey ceased to be threatening. The century closed with the great crash of the French Revolution.

During the first fifty years of the nineteenth century Belgium became a separate constitutional kingdom; the independence of Greece was secured; the King of Prussia was forced to grant a constitution and a representative government. In 1854–56 occurred the Crimean War; in 1861 the chief separate states of Italy consolidated under one constitutional king, though the political unity of all Italy was not effected until 1870; in 1864 Prussia and Austria wrested Schleswig-Holstein from Denmark. In 1866 the N. German Confederation was established; 1870 saw the great Franco-Prussian War, ending in the firm establishment of the French Republic and the crowning of the Prussian king as emperor of the new German Empire. In 1877 Russia declared war against Turkey, and but for the intervention of Great Britain and other powers would have ended her rule in Europe. Turkey recognized the independence of Roumania and Servia, while the principality of Bulgaria became practically independent. In the early part of 1897 the Christian population of Crete declared in favor of annexation to Greece, and a Greek army was landed at the request of the insurgents. The great powers, however, intervened and blockaded the Cretan ports. Autonomy was promised, but did not satisfy either the Cretans or the Greeks. In the war which ensued, Greece was beaten by the Turks at almost every point, and instead of winning Crete lost a few small areas along her N. frontier. In 1908 Bulgaria declared her independence and the prince assumed the title of king. In 1908–9 Bosnia-Herzegovina became a part of the Austro-Hungarian empire.

Eurydice (ū-rĭd'ĭ-cē), wife of Orpheus (*q.v.*). She died from the sting of a serpent, and Orpheus descended to the infernal regions, and persuaded Pluto to restore her to him on condition that she should walk behind Orpheus, and that he should not look back until they had reached the upper world. But he was tempted to look back, and finally lost her. There are seven other mythical persons bearing the name Eurydice.

Euryl'ochus, one of the companions of Ulysses; the only one not changed by Circe into a hog.

Eurym'one, infernal deity who gnawed the dead to the bones and was always grinding her teeth; also a daughter of Apollo.

Euryn'ome, in Greek mythology, a daughter of Oceanus and mother of the Graces.

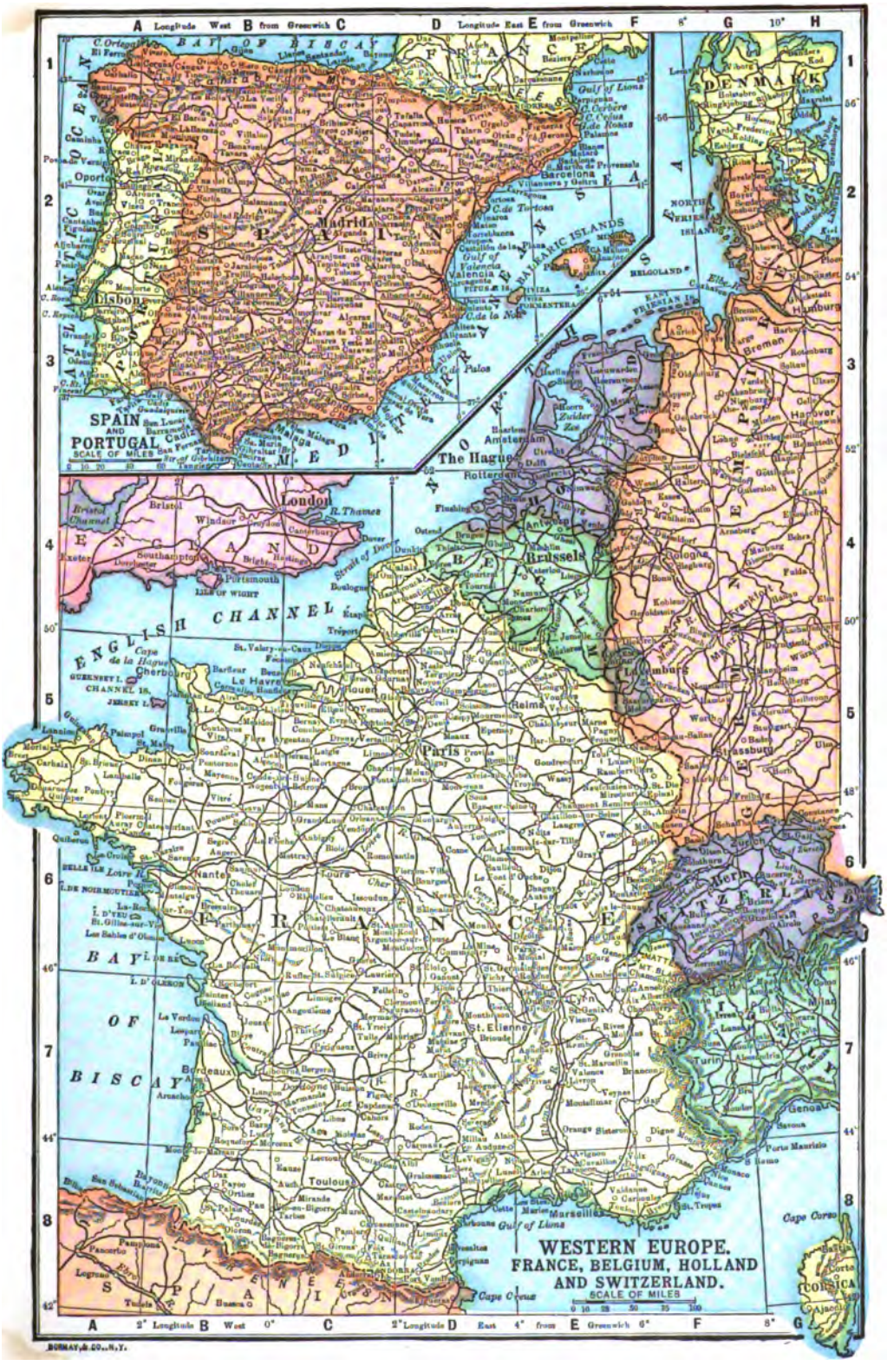
Euryp'ilus, son of Telephus, who, through love of Cassandra, assisted Priam against the Greeks, but lost his life; also a soothsayer of Ceos, who assisted the Greeks with forty ships.

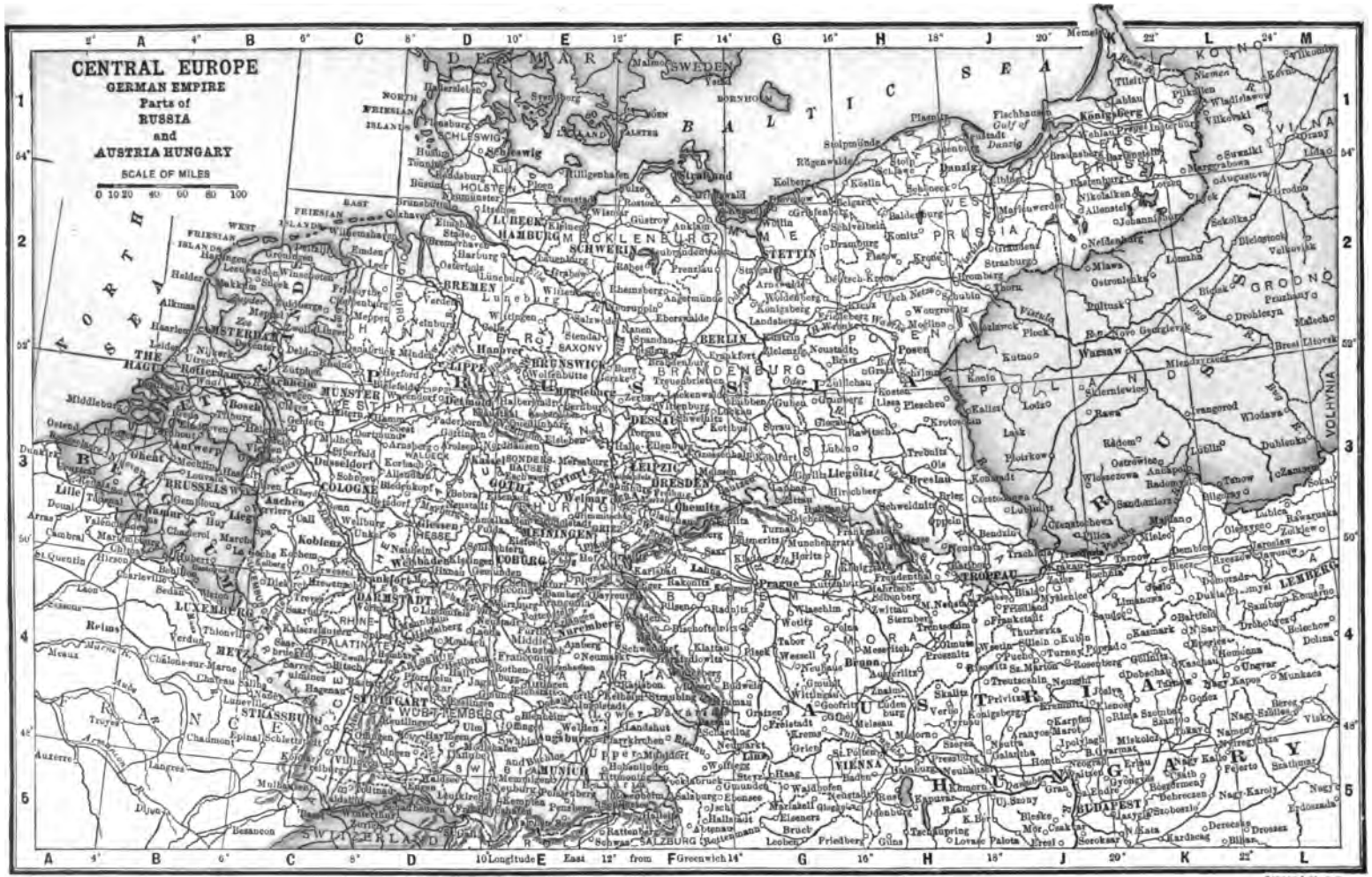
Eurys'thenes and Pro'cles, twin sons of Aristodemus, and progenitors of the two royal lines of Sparta.

Eurys'theus, son of Sthenelus, and King of Mycenæ, who, at Juno's instigation, set his brother Hercules twelve difficult labors.

Euse'bius Pam'phili, abt. 260–340; Bishop of Cæsarea, theologian and writer of ecclesiastical history; b. Palestine; assumed the surname "Pamphili" in honor of his friend Pamphilus the martyr; became Bishop of Cæsarea, 314 or 315 A.D., and took a prominent part in the Council of Nice; was inclined to moderation and peace, used his influence to reinstate Arius, and was a leader of the Semi-Arians; one of the bishops who censured Athanasius at the Council of Tyre, 334; was very eminent for learning, as well as for talents. He wrote in Greek, besides several works that are lost, an "Ecclesiastical History from the Christian Era to 324 A.D.," which is of the greatest value; a "Life of Constantine the Great," "Gospel Preparation," a "Universal History or Chronicle," and a work "On the Proof or Demonstration of the Gospel."

Eusta'chian Tube, named after its discoverer, Bartolomeo Eustachi, an Italian anatomist, d.


WESTERN EUROPE,
FRANCE, BELGIUM, HOLLAND
AND SWITZERLAND.
SCALE OF MILES
SPAIN
AND
PORTUGAL
SCALE OF MILES
Longitude West from Greenwich
Longitude East from Greenwich
BAY OF BISCAY
ATLANTIC OCEAN
ENGLISH CHANNEL
MEDITERRANEAN SEA
NORTH SEA
BALEARIC ISLANDS
Madrid
Lisbon
Barcelona
Valencia
The Hague
Amsterdam
Rotterdam
Brussels
London
Paris
Reims
Strasbourg
Hamburg
Bremen
Hanover
Berlin
Frankfort
Cologne
Metz
Nancy
Dijon
Lyons
Nantes
Bordeaux
Toulouse
Marseilles
Turin
Genoa
Milan
Corsica
Ajaccio
Cape Corso
Gulf of Lions
Pyrenees
Alps
Switzerland
Denmark
Copenhagen
Elsinore
Kiel
Lübeck
Rostock
Stettin
Danzig
Königsberg
Memel
Riga
Mitau
Libau
Windau
Dantzic
Posen
Breslau
Dresden
Leipzig
Magdeburg
Hamburg
Bremen
Hanover
Berlin
Frankfort
Cologne
Coblenz
Mayence
Metz
Nancy
Strasbourg
Basle
Zurich
Berne
Geneva
Lyons
Dijon
Nantes
Bordeaux
Toulouse
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Turin
Genoa
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Switzerland
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Kiel
Lübeck
Rostock
Stettin
Danzig
Königsberg
Memel
Riga
Mitau
Libau
Windau
Dantzic
Posen
Breslau
Dresden
Leipzig
Magdeburg


CENTRAL EUROPE
GERMAN EMPIRE
Parts of
RUSSIA
and
AUSTRIA HUNGARY
SCALE OF MILES
0 10 20 40 60 80 100
Longitude East from Greenwich
BORMAY & CO., N.Y.

574; in anatomy, the canal leading from the middle ear to the pharynx, or passage from the mouth to the gullet. In the amphibia, reptiles, birds, and mammals it enters into close connection with the auditory organ proper. Its function is to equalize the pressure of the air on either side of the tympanic membrane (which separates the drum from the external ear), and when it becomes closed by disease the hearing is injured.

Eu'taw Springs, small affluent of the Santee River in S. Carolina, about 50 m. NW. of Charleston, near which was fought, September 8, 1781, a battle between about 2,000 Americans under Gen. Greene and about 2,300 British under Col. Stuart, the former being successful. The British lost 133 killed and wounded, and 500 prisoners; American loss, 535 in killed, wounded, and missing.

Euter'pe, one of the Muses, considered as presiding over lyric poetry, the invention of the flute being ascribed to her; usually represented crowned with flowers, a flute in her hand.

Eutro'pius, or Flav'ius Eutropius, Latin historian who flourished abt. 350–70 A.D.; was secretary under Constantine, and accompanied Julian in his expedition against the Persians; wrote an "Epitome of Roman History" from the foundation of Rome to the time of Valens, which became very popular, and has been extensively used as a schoolbook in modern times.

Eutyches (ū'tĭ-kēz), aged superior of a monastery near Constantinople; was a zealous opponent of the doctrines of the Nestorians, and was charged with teaching that there is in Christ only one nature, *viz.*, the divine one; was condemned by the Council of Constantinople in 448 A.D., but this decision was reversed by the Council of Ephesus in 449. The doctrines of Eutyches were again condemned by the general Council of Chalcedon, 451 A.D., soon after which he died. The Eutychians were often called Monophysites.

Euxine (ūk'sĭn) **Sea.** See BLACK SEA.

Evad'ne, daughter of Mars and Thebe, who threw herself into the funeral pile of her husband Cateneus from affection.

Evag'oras, d. 374 B.C.; King of Salamis in Cyprus; was descended from Teucer, a famous hero; began to reign, 410 B.C., and as an ally of the Athenians and Egyptians waged a long war against the King of Persia, who invaded Cyprus; assassinated; succeeded by his son Nicocles.

Evangel'ical Alli'ance, voluntary association of evangelical Christians from different churches and countries to promote religious liberty, Christian union, and coöperation in every good work; founded in London in 1846 by some 800 Christians, who adopted nine doctrinal articles, simply as an expression of the essential consensus of evangelical Christians whom it seemed desirable to embrace in the alliance. It claims no official and legislative authority that might in any way interfere with the internal affairs of the denominational organizations or the loyalty of its members to their particular communion. The first general conference took place in London, 1851. The branch in the U. S. held a national conference, the tenth, in connection with the Columbian Exposition at Chicago, 1893.

Evangelical Associa'tion, popularly but incorrectly known as the GERMAN METHODIST CHURCH, body of American Christians, chiefly of German descent, organized in 1800 by the Rev. Jacob Albright, a native of E. Pennsylvania. Regarding the doctrines and morals that prevailed in the German churches of that part of the state as corrupt, Albright undertook abt. 1790 a work of reform among them. In the course of time annual conferences were established, and in 1816 the first general conference was held in Union Co., Pa. Since 1843 the general conference, consisting of delegates from the annual conferences, has regularly met once every fourth year. During the first thirty years of its existence the Evangelical Association met with violent opposition, but since then it has quietly and rapidly advanced. As the Church repeatedly took action on the slavery question and sided with the anti-slavery churches, its progress was for many years wholly within the boundaries of the N. states. Differences of long standing led to a division in the Church, 1891. In general theology the Evangelical Association is Arminian; with regard to sanctification, Wesleyan; in the form of government and mode of worship it generally agrees with the Methodist Episcopal Church (of which Albright, prior to beginning his reformatory labors in the German churches, was a member). The literary institutions of the Church are: The Northwestern College, Naperville, Ill.; Union Seminary, New Berlin, Pa.; Blairstown Seminary, Blairstown, Iowa; and Ebenezer Orphan Institution, Flat Rock, Ohio. At present the Church has twenty-two annual conferences, inclusive of those of Canada and Germany. In 1908 the two bodies had 1,503 ministers, 2,666 churches, and 173,641 communicants.

Evangelical Church Con'ference, one of the periodical meetings of the Protestant state churches of Germany. The idea of these meetings originated with King William of Würtemberg in 1815. The first conference, held at Berlin, 1846, had representatives from almost every German state. At the second conference, held, 1852, at Eisenach, an official central organ was established at Stuttgart (*Allgemeine Kirchenblatt für das evangel. Deutschland*). The conferences are held at Eisenach every two years.

Evangelical Church'es, bodies of Christians which accept the Bible as the only rule of faith and practice, and believe in the divinity of Christ, in the necessity of his atonement, and in personal repentance and faith as essential to salvation. "Evangelische Kirche" (Evangelical Church) is the official title of the Established Church of Prussia, formed, 1817, by the union of the Lutheran and the Reformed churches. The Lutherans and Reformed (Calvinistic) churches of Baden, Würtemberg, and other German states have been similarly united.

The "evangelical party" in the Church of England is that section of the Church which attaches special importance to the teachings of the New Testament, and is censured as neglecting or slighting Church authority and underrating the efficacy of the sacraments.

Evangelical Coun'sels, or Counsels of Perfec'tion, such directions or admonitions in the Roman Catholic Church as are not in themselves obligatory upon anyone, but are recommended by the Church to some persons as highly advantageous to spiritual excellence. The chief evangelical counsels are voluntary celibacy, poverty, and obedience to monastic rules, etc. There are reckoned twelve of these counsels.

Evangelical Un'ion, body of Scotch Independents, called "Morisonians," from Rev. James Morison, their original leader. In 1843 they left the United Secession Church, and soon were joined by some Congregational churches of Scotland and England. They reject a part of the Calvinistic doctrines, and have a theological school at Glasgow. The three propositions for which Morison was deposed and on which the union was formed were: that faith is one's belief in Christ's dying for him; that the "Spirit is poured out upon all flesh" and strives with all unbelievers; and that the atonement was universal. The union embraces about ninety churches.

Ev'ans, Mary Ann, or Marian. See ELIOT, GEORGE.

Evans, Oliver, 1755–1819; American inventor; b. Newport, Del.; invented the automatic flour mill, the high-pressure steam engine, a machine for making card teeth, a steam dredge, and the "Cornish boiler." He wrote "The Young Engineer's Guide," "Miller and Millwright's Guide."

Ev'anston, town in Cook Co., Ill.; on Lake Michigan; 12 m. N. of Chicago; is a very handsome suburban town, the seat of Northwestern University and the Garrett Biblical Institute. Pop. (1906) 22,949.

Ev'ansville, capital of Vanderburg Co., Ind.; on the Ohio River; 185 m. below Louisville; has a fine U. S. Govt. building, a U. S. Marine Hospital, the Southern Indiana Hospital for the Insane, an art gallery, flour mills, foundries, machine shops, woolen and cotton mills, and manufactures of furniture, lumber, saddlery and harness, liquors, leather, farming implements, etc.; is the principal shipping point of SW. Indiana, and in commerce is one of the chief cities in the state. Pop. (1907) 63,957.

Evapora'tion, passage of a substance from the liquid or solid state to the condition of vapor; especially such change at a temperature below the boiling point. Evaporaton takes place in a vacuum more rapidly than in the air, and more rapidly the higher the temperature. It has been shown that the elastic force of all vapors is the same, whether mixed with gas or air, or not; and that air is never truly saturated with vapor unless it contains an amount sufficient to saturate a vacuum of the same extent, and at the same temperature. (A space is saturated when filled with all the vapor it can hold in the form of vapor at the given temperature.) Evaporation is caused by heat, which is absorbed when vapor is formed, and the most intense degree of cold known is produced in bodies by the evaporation near them of volatile liquids. The lowest point yet artificially produced, about —220° C., has been obtained by the evaporation *in vacuo* of liquid oxygen. See VAPOR.

Ev'arts, William Maxwell, 1818–1901; American lawyer and statesman; b. Boston, Mass.; admitted to the bar in New York, 1840, where he practiced with distinction; was leading counsel for Pres. Johnson in his trial before the Senate, 1868; Attorney-General of the U. S., 1868–69; one of three lawyers appointed by Pres. Grant, 1871, to defend the interests of the U. S. before the tribunal of arbitrators who met at Geneva to settle the *Alabama* claims; principal counsel for the Republican Party before the Electoral Commission on the Hayes-Tilden returns, 1877; U. S. Secretary of State, 1877–81; U. S. Senator, 1885–91. Among his public addresses are his eulogy on Chief Justice Chase, 1873; "Centennial Oration," in Philadelphia, 1876, and the oration at the unveiling of Bartholdi's statue of "Liberty."

Eve (Hebrew HAVVAH), in scriptural history, the name given by Adam to his wife; derived from the verb *hayoh* (to live), and applied to her as "the mother of all the living." With the birth of Seth her history ceases.

Evec'tion, inequality of the moon's motion, depending on the position of the transverse axis of the moon's orbit, with reference to the earth's radius vector. The eccentricity of the lunar orbit varies with the relative position of these lines. It is maximum when they are coincident with, and minimum when they are perpendicular to, each other.

Ev'elyn, John, 1620–1706; English author; b. Wotton, Surrey; enjoyed great favor at the court after the Restoration, and held positions of honor and trust, but no office. He was a prolific writer, and published "Sylva," an elaborate treatise on arboriculture; "Navigation and Commerce, their Origin and Progress," "A Parallel of Ancient and Modern Architecture," etc.; but his most important and most interesting work is his "Diary," written without any idea of publication.

Ev'erest, Mount, believed to be the highest mountain on earth; in the E. range of the Himalayas, in N. Nepaul. Altitude, 29,002 ft.

Ev'erett, Edward, 1794–1865; American orator and statesman; b. Dorchester, Mass.; Prof. of Greek at Harvard, 1819–25; editor *North American Review,* 1820–44; represented the district of Middlesex in Congress, 1825–35; was Governor of Massachusetts, 1836–40; president of Harvard, 1846–49; U. S. Secretary of State, 1852–53; U. S. Senator, 1853–54; unsuccessful candidate for Vice President of the U. S. on the "Union" ticket, 1860. He spent the last ten years of his life in the exercise of

his oratorical powers in behalf of charitable institutions, in commemorating historical events, or in eulogizing illustrious persons.

Everett, city in Middlesex Co., Mass., adjoining Boston, Chelsea, and Malden, of which last it formed part until incorporated as a town, 1870; has two memorial libraries, chemical works, steel and structural iron works, and a number of small factories. Pop. (1900) 29,111.

Everett, county seat of Snohomish Co., Washington (settled 1891, incorporated as a city, 1893), 28 m. N. by E. of Seattle, on an arm of Puget Sound, which gives it an excellent harbor. Everett is surrounded by a region rich in lumber and minerals, the development of which as well as the advantages of its natural situations has greatly aided its rapid growth. Pop. (1905) abt. 25,000.

Ev'erglades, extensive region in S. Florida, S. of Lake Okeechobee, consisting of a great shallow lake, in which are many low islands covered with a dense jungle of pines, palmettoes, vines, and tropical trees. The water between the islands is from 1 to 6 ft. deep. Much of this region has been reclaimed.



EVERLASTING FLOWERS.

Ev'ergreens, plants which hold their leaves throughout the winter. Horticulturists usually speak of two classes of evergreen plants, the broad leaved, like the laurels and mahonias, and the narrow leaved, or coniferous, including the pines and spruces, but many conifers, commonly considered evergreens, have deciduous leaves, as the larches and bald cypress. The leaves of some evergreen plants persist little more than a year, but they do not fall until new ones have appeared. The leaves of pines and spruces fall when from two to six or even more years old. See DECIDUOUS TREES.

Everlast'ing Flow'ers, common name of several genera of the Composite order, having flowers which, if dried and preserved, retain their form and color many years. They are often called immortelles.

Evesham (ēvz'ŭm), town of Worcester, England; on the Avon; in the beautiful Vale of Evesham, 15 m. SE. of Worcester; has remains of an abbey built abt. 700 A.D. Most of the surrounding country is occupied by market gardens. Here Edward, Prince of Wales, afterwards Edward I, defeated Simon de Montfort and the barons, 1265.

Evic'tion, in law, the act of dispossessing one of lands or tenements, as when a landlord ejects a tenant who is in arrears in his rent, or when a third person dispossesses a tenant by means of a title superior to that of the landlord, or a vendee (purchaser) by a title superior to that of the vendor (seller).

Ev'idence, in law, the means of establishing an allegation made in a court of justice. Evidence is *direct* when it is offered simply to establish the fact which it concerns; is *circumstantial* when its object is to lead the mind of the hearer to deduce or infer some other fact from it. *Presumptions* are of two kinds—of law and of fact. A *conclusive* presumption of law takes place when a legal conclusion is arrived at which no evidence is admissible to rebut. An illustration is that a child under seven years of age cannot commit a felonious crime. When evidence can be offered to rebut a presumption of law, it is said to be *disputable.* An instance is the rule in criminal law that one charged with crime is presumed to be innocent until he is proved to be guilty. Under this theory, when a state of facts is once established, it is presumed to exist until there is some evidence to the contrary. Thus a man engaged in trade is assumed to follow the ordinary course of business, or the incumbent of a public office to perform its duties in the usual manner. Life is presumed to continue unless there is evidence of death, or sanity until evidence is offered to establish insanity.

The leading rules as to the production of evidence are: certain matters may be judicially taken notice of without proof, such as the recurrence of the seasons, matters of common knowledge, etc.; evidence must correspond with the allegations in the pleadings, and be confined to the points in issue; the burden of proof is with him who holds the affirmative; the best evidence must be produced of which the natures of the case admits, original documents should be produced, although if they are destroyed copies may be introduced as the best secondary evidence available; hearsay evidence is in general inadmissible; testimony should in general concern matters of knowledge as distinguished from opinion, the testimony of experts being the principal exception; certain evidence, otherwise admissible, is excluded on grounds of public policy, such as the privileged communications between an attorney and his client, or between husband and wife; in certain cases written evidence must be resorted to rather than oral; oral contemporaneous evidence is not admissible to vary the terms of a written instrument. A written receipt, however, being usually informal, may be explained as having conditions which it does not contain. Leading questions, *i.e.,* those that suggest their answer, may not be asked on the direct examination, but are per-

mitted in the wider range given on cross-examination. A party may contradict the evidence of his own witness, but may not attack character. A witness is privileged from giving an answer which would tend to convict him of a crime or degrade him in public estimation. See HEARSAY EVIDENCE; STATE'S EVIDENCE.

Ev'idences of Christian'ity, proofs of the divine origin of the religion founded by Jesus Christ. The *external* evidences are such as relate to the fact or existence of Christianity, rather than to its nature or system—the credentials of revelation as distinguished from its contents: (1) Prophecies, which have been fulfilled in the course of ancient empires, in the coming of Messiah, in the fortunes and fate of the Jews, and in the progress of the Christian Church; (2) Miracles, which were wrought by prophets and apostles in attestation of their divine commission as teachers, disclosed in the life and death of Christ, and confirmed by the success of Christianity in the first age; (3) Historical testimonies to the authenticity and genuineness of the sacred writings, afforded not only by undesigned coincidences among them, but by contemporaneous heathen literature and by modern antiquarian research. The *internal* evidences are such as appear in Christianity itself: (1) In its doctrines, such as the existence, perfections, and policy of the Creator, the origin of the world, the scheme of redemption, the state and destiny of man; (2) In its precepts, such as the Ten Commandments, the Sermon on the Mount, the counsels of the apostles; (3) In its example, such as those of evangelists, saints, and martyrs, and, above all, of Jesus himself; (4) In its effects, not only upon the welfare of individuals, but upon the interests of society, as seen in works of charity, in the arts of peace, in humane laws, and free institutions.

Still further classes of evidence are of a mixed nature, partly external and partly internal, and serve to show the connection and consistency of Christianity with other facts and truths. Such are: (1) Experimental evidences, acquired by those who have personally tested in their own faith and practice the doctrines, precepts, and promises of the Gospel; (2) Scientific evidences, which illustrate the existence and attributes of the Deity, and confirm the allusions of Scripture to physical, mental, and moral phenomena; (3) Philosophical evidences, derived from reason and experience as to the probable existence of a divine government, a future state, a supernatural revelation, and a scheme of redemption, such as are found in the Scriptures. See CHRISTIANITY.

E'vil, total or partial absence or negation of good, and the presence of imperfection, suffering, or sin. The question of the origin of evil has in every age attracted the attention of thoughtful minds. The Zoroastrians and Gnostics tried to solve it by the dualistic theory of the opposition of a good and an evil principle. Others have maintained that evil is a necessary part of the Divine economy, and that under the superintendence of Infinite Wisdom evil will result in the highest possible good. It seems certain that moral freedom itself implies at least the possibility of an evil choice, so that evil must potentially exist where goodness exists.

Evil Eye, mysterious power of injury which was generally ascribed to the look of a person having from birth an eye of such power. The Greek and Roman classics contain numerous references to this belief, which was also very common in the Middle Ages. In Mohammedan and uncivilized countries this superstition is still almost universal; it is found among the peasantry of more civilized lands, and in Italy appears among all classes. It prevails especially in W. Africa. Wherever it prevails charms are worn to avert the mischief believed imminent from an evil eye, which was considered especially dangerous to young children.

Evolu'tion, in algebra and arithmetic, the extraction of roots; in other words, the inverse operation to involution. The object of evolution is to ascertain the quantity which multiplied by itself a stated number of times yields a given result. In a wider sense, evolution may be regarded as synonymous with the solution of a binomial equation.

Evolution, an unrolling or unfolding; especially the development of a complex system or organism from a simpler one. In cosmology, evolution is the development of the universe from a primitive homogeneous medium, by means of forces inherent in it; in biology, it is the development of the organic world as we see it, from simpler organisms, or, going further back, from inorganic matter. The most familiar system of cosmic evolution is that contained in the works of Herbert Spencer. In the more limited field of chemistry some attempts have been made at a theory of a development of the elements from a primitive stuff. The recently discovered phenomena of radioactivity and the new theories of matter based thereon have given an impetus to such theories. Popularly the word "evolution" is used chiefly in its biological sense, and is confined by some to Darwin's theory of the origin of species by natural selection. But biological evolution is an older idea than Darwin. Among modern naturalists, Linnæus and Buffon had definite conceptions of a progressive organic development. The idea was elaborated by Kant, Goethe, St.-Hilaire, and others; but the chief pre-Darwinian evolutionist was Lamarck, whose modern disciples (the "neo-Lamarckians") consider his work as epoch making. In his system the inheritance of acquired characteristics played an important part. Organs were developed by use and handed down to descendants in their developed state to be further developed. According to the stricter Darwinians, such inheritance is impossible; and these do not therefore rate Lamarck's work as of the first rank. The conclusions of Darwin regarding the origin of species, which have borne so important a part in the modern development of the evolution theory in biology, were arrived at almost simultaneously by Alfred Russell Wallace.

According to Darwin, the factors in the pro-

duction of new species are variation, heredity, and the struggle for existence with survival of the fittest. Variation he regards as purely spontaneous. No child is quite like its parents, and the alteration may take place along any line and in any direction. Breeders take advantage of these spontaneous variations to accentuate some selected feature for man's use, such as the secretion of milk in cows or great strength of limb in draught animals. In like manner nature accentuates certain features automatically, not by selecting parents, but by killing off the offspring. Many more offspring are produced than can possibly live, especially among plants and the lower animal organisms, and a struggle for existence results. Those individuals survive this struggle that are best suited to live in their special environment. Their peculiarities are transmitted by heredity to their descendants, and so on. In course of time individuals are thus developed that are more and more perfectly fitted to the environment, and hence species arise. Elaborated by Huxley, Spencer, Lyell, Lubbock, Haeckel, and others, this theory was soon applied even to man, whose descent from some remote ancestor of the apes was maintained in Darwin's "Descent of Man," 1871.

It will be noted that Darwin's theory supposes the steps of evolution to consist in the selection of spontaneous variations, while Lamarck's was based on the determination of variation by use. Thus, if we admit that the son of a noted pianist has inherited his father's ability, the Lamarckian view would be that the skill acquired by years of practice has been transmitted by heredity; the Darwinian, that the only inheritance was of an aptitude, existing in the father at birth. On this view the son would have been equally skilled had his father never learned to play the piano at all. Biologists are still divided over this question, in some one of its many phases. The immediate pupils and successors of Darwin were inclined to assert that their master, in laying down his principle of natural selection, intended to exclude all other possible agencies of evolution; but biologists now incline to think that in laying stress on his own discovery he did not intend to bar out selection of other means. Hence we have now many variations of the Darwinian idea, some of them in combination with that of Lamarck. One of the most striking is the recent contention of Hugo de Vries, which he supports by observations on plant breeding, that evolution may take place in jerks, by comparatively brief periods of active variation, separated by intervals of rest during which there is little danger from generation to generation.

Those who have carried the evolutionary doctrine furthest, like Haeckel, now profess to be able to trace the history of life from its first germ through various forms to its highest development in man. According to Haeckel's view, the line of descent passes from the protozoön successively through the cœlenterates, worms, fish, reptiles, and mammals. The development of the individual, before birth, goes through a very similar series of changes; and these changes are thought to be reminiscent, as it were, of the changes through which the race has gone during the ages. Study of the geological record, as shown in fossils, is also thought to substantiate this position, although there are necessarily wide breaks in the record. Some striking series exist, as that which represents the development of the modern horse from a five-toed creature about the size of a small dog. The successive stages here are all preserved in the fossil record. Evolutionists believe that in the case of man further evolution is likely to be mental rather than physical, being in the line of the advances in civilization from the savage up, during which time very little physical change in man's body has occurred, except that necessary to adapt it to a more complex brain structure.

Opponents of evolution, besides a general denial of the sufficiency of the arguments of its advocates, take their stand on the enormous length of time required for the changes indicated by the theory, on the slight changes or absence of change during recorded history, and on the inadequacy of the fossil record. In spite of this, probably most biologists to-day are evolutionists, in one degree or another. Opposition based on the supposed contradiction of revealed religion by the theory was formerly widespread and violent. Some early evolutionists believed in development interrupted at intervals by special creations (compare De Vries's theory, mentioned above). But many sincere believers in the Christian faith now accept some form of evolutionary theory as a description of the methods of the Creator rather than a denial of his agency or work. See DARWINISM; NEO-LAMARCKIANISM.

Evolutions, Mil'itary, movements by which troops change the order, position, and direction of their primary formation. Marching, countermarching, changing front, forming line, facing, wheeling, defiling, deploying, etc., come under this head. All evolutions are performed according to a regulated system, which differs in its details in the armies of different nations.

Évremond (āvr-mōn'), **Charles de Saint-Dénis** (Seigneur de Saint-Evremond), 1613–1703; French courtier and *littérateur*; b. near Coutances, Normandy; entered the army abt. 1629, and became a friend of Turenne and the Prince of Condé; having given offense to Louis XIV by his raillery and sarcastic wit, he fled to England, 1662; gained the favor of Charles II, who granted him a pension. He never returned to France; wrote dramas, essays, and letters.

Ewald (ā'vält), **Georg Heinrich von,** 1803–75; German Orientalist and biblical critic; b. Göttingen; became Prof. of Philosophy at Göttingen, 1831, and of Oriental Languages, 1835; was Prof. of Philosophy and then of Theology at Tübingen, 1838–48; again held the chair at Göttingen, 1848–67, whence he was removed for political reasons. In 1869 he was elected to the N. German Parliament, where he bitterly opposed Prussia. He wrote grammars of Hebrew and Arabic, a history of Israel, and a work on biblical theology; also

many articles on Semitic subjects in his "Year Books of Biblical Science," 1849–65.

Ewald, Johannes, 1743–81; Danish poet; b. Copenhagen; works include the drama "Adam and Eve," the prose tragedy "Rolf Krage," the tragedy in iambic pentameters "The Death of Balder," the comedy "The Fishers," in which occur his best songs; "King Christian stood by the High Mast," and "Little Gunvor"; poems, including "The Blessings of Rungsted."

Ewell (ū'ĕl), **Richard Stoddert,** 1817–72; American military officer; b. District of Columbia; graduated at West Point, 1840; served on the frontier and in the Mexican War; lieutenant general in the Confederate army; assigned on the death of Jackson to the command of his corps, the Second Corps of Lee's army, which he led at the capture of Winchester, at Gettysburg, the Wilderness, and Spottsylvania Court House. He was relieved from duty in the field because of physical inability, and took charge of the Department of Richmond; settled after the war in Tennessee.

Exac'tions, legal term of ecclesiastical jurisprudence, used in the Middle Ages to denote such duties or contributions, demanded by the clergy of their parishioners, as were extraordinary, either because they were new and against custom or because their amount was unduly increased. They were unlawful, and it was found necessary repeatedly to denounce them.

Exam'ple Books. See EXEMPLA BOOKS.

Ex'arch, in the E. Roman Empire, an ecclesiastical or civil dignitary invested with extraordinary authority. At first exarchs were officers delegated by the patriarch or synod to visit a diocese to restore discipline. The exarch was also the superior of several monasteries. In the modern Greek Church the exarch is a legate *a latere* of the patriarch. This title was given to the prefects who for two centuries governed that part of Italy which was subject to the Byzantine Empire. They held their court at Ravenna, and combined civil, military, judicial, and often ecclesiastical authority. The exarchate was overthrown by the Lombards, 752.

Ex cath'edra (Latin "from the chair"), phrase originally applied to decisions given by popes or prelates in a solemn judicial manner. Hence it is applied to every decision pronounced by anyone in the exercise of his proper authority, as a judge on the bench, etc.

Ex'cellency, title borne originally by the Lombard kings, and then by the emperors of the West from Charlemagne to Henry VII. It has become the title of every nobleman in Italy; in France, a duke is addressed as *excellence,* and a prince as *altesse.* It is the usual address of foreign ministers and of the governors of British colonies. There is no legal sanction for the application of the title to any officer in the U. S. except the Governor of Massachusetts, but the title is applied by courtesy to the President of the U. S. and the governors of many of the states.

Excelmans', or **Exelmans', Remi Joseph Isidore** (Baron), 1775–1852; French marshal; b. Bar-le-Duc; served with distinction at Austerlitz, 1805, and gained the rank of general of brigade for his conduct at Eylau, 1807; in the Russian campaign, 1812, he commanded a division with much skill. He directed a corps at Waterloo, 1815, after which he passed four years in exile; was restored to his title as a peer, 1831, and became a marshal of France, 1851.

Exchange', (1) a place of meeting (also called a BOURSE) of traders in any given line of business, as stock exchange, produce exchange, etc.; (2) commercial paper and the transactions to which it gives rise. Bills of exchange as a method of commercial settlements are probably of nearly coincident date with the origin of commerce. Owing to the balance of trade or debt between any two places, either domestic or foreign, there may be a difference of value between a given quantity of gold or silver in such places respectively. This difference is called the exchange, and it is generally expressed by a percentage on the bill that is bought for remittance. The exchange is said to be at par when there is no such difference, or "when a given quantity of gold in one country is convertible at the market price into such an amount of the currency of that country as will purchase a bill of exchange on the other country for such an amount of the currency of that other country as will there be convertible at the market price into an equal quantity of gold of the same fineness."

Exchange is said to be in favor of a country when a given quantity of gold purchased in it is convertible into such an amount of the currency of another country as will there be convertible into a greater quantity of gold of the same fineness; and it is said to be adverse, or against a country, when the proceeds of a bill of exchange will yield in the country to which it is transmitted a smaller quantity of gold of the same fineness. The effective limitation, therefore, to the price of a bill of exchange designed for transmission to another country is the cost of sending gold. The principal circumstance which determines the cost of gold in a country is the state of its foreign account. If its exports are continuously less than its imports, it must transmit gold or silver to pay the difference.

Exchequer, in Great Britain, the executive department corresponding to the Treasury Department in the U. S.

Exchequer Bills, negotiable interest-bearing bills issued at the British Exchequer, under the authority of Parliament, as security for money advanced to the government.

Exchequer, Chan'cellor of the, title of the highest finance minister of the British Govt. This office is from its nature necessarily intrusted to a Commoner. When the Prime

Minister is a member of the House of Commons, he sometimes holds the office of Chancellor of the Exchequer.

Exchequer Tal'lies, tallies of wood by means of which, up to 1783, the English exchequer checked its accounts. The checking was done as follows: Seasoned sticks of hazel, ash, or willow were inscribed on one side with the sum for which the tally was an acknowledgment, and on the other with the Roman characters indicating the same sum, with the date and payer's name. Notches of varied appearance stood for various amounts. The deputy chancellor split the stick with knife and mallet in such a way that each check was divided; and when the payer presented his tally for payment, it was first matched with its corresponding tally in the exchequer office. This ancient and clumsy device was nevertheless an almost perfect protection against forged applications for money. The old tallies were stored in the Parliament House, and in 1834 Parliament ordered them to be burned.

Excise', tax on goods of home production, as distinct from customs or duties on imports. The term is chiefly used in Great Britain, the corresponding term in the U. S. being "internal revenue." The British excise system as a system dates from the Long Parliament, 1643. The present revenue of the United Kingdom from taxes of this kind is upward of £30,000,000. The chief duties of the sort in France are those on spirits, wine and beer, on tobacco and snuff, and on gold and silver plate; with them may be included legacy and succession duties and stamp taxes on various commercial transactions. See TAXATION.

Exclu'sion Bill, in English history, a bill designed to exclude the Duke of York (later King James II) from the throne, because he was a Romanist; adopted by the House of Commons, 1679, but rejected by the House of Lords. In the U. S. the term is popularly applied to the Acts of Congress concerning Chinese immigration.

Excommunica'tion, formal expulsion of a person from privileges or from membership in a religious society; inflicted by church authority upon persons accused of misconduct or heresy. The ancient Israelites excommunicated offenders by exclusion from the camp, by "cutting off from the people," and in later times by "putting out of the synagogue." Excommunication in the Christian Church was established by Christ's teachings, and by the precept and example of the apostles.

In early times—as also in the Roman Catholic and in several of the Reformed churches at present—there was a lesser and a greater excommunication; the former a virtual suspension from Church privileges, the latter a formal expulsion. The greater excommunication in the Latin Church is less severe than the anathema. Excommunication was not infrequently employed by the popes in former times as a punishment for refractory monarchs, and even for whole nations. In Prussia and Switzerland the excommunication of the Old Catholic priests by the Catholic bishops, 1871–73 brought on severe conflicts between the State and the Church. Excommunication is rarely resorted to in modern days in any other than the Roman Communion.

Execu'tion, in civil law, the formality of signing, sealing, and delivering a deed, or of signing and publishing a will; in civil actions, the carrying out the final judgment of the court, or, more strictly, the writ directing the sheriff, coroner, or marshal to carry such judgment into effect; also a common term for the infliction of the death penalty. See CAPITAL PUNISHMENT; ELECTROCUTION.

Exec'utive Depart'ment, The, in the U. S. Govt., the branch of the public service which attends to the execution of the laws of the general (Federal, national) government. This department is under the direct control of the President, who is the principal executive officer. The duties of the Executive Department are the most extensive of all. The departments are: State, Treasury, War, Justice, Navy, Post Office, Interior, Agriculture, and Commerce and Labor. See CABINET, and titles of the several departments.

Exec'utor, person appointed to carry into effect the directions contained in a last will and testament. When executors are not named in a will, or are incompetent, or refuse to act, letters of administration "with the will annexed" may be issued, under which the same powers may be exercised that could have been by competent executors duly appointed.

Exege'sis, or Exeget'ical Theol'ogy, first and most important part of theological science, covering the whole field of biblical literature, or all that pertains to the accurate and detailed explanation of the Old and New Testaments. It originated among the Jewish rabbis, but was afterwards extensively cultivated among the Christian Fathers, the Reformers, and the divines of all ages. It has received much impulse from Oriental discoveries (in Egypt, Palestine, Babylon, and Assyria) and from the advances in the knowledge of the classical and Semitic languages.

Exem'pla Books, collections made in mediæval times of stories introduced into sermons (usually at the close) to illustrate some precept or to arouse the attention of the congregation. The technical word for a story so used was exemplum. Gregory the Great used legends in this way in his homilies (before 604), but the practice did not become common until the end of the twelfth or the beginning of the thirteenth century, when the foundation of the Franciscan and Dominican orders gave a great impulse to preaching, and entirely changed its character. These collections contain an immense amount of material of all kinds: historical anecdotes, fables, legends, jests, popular tales, etc. Their value consists partly in the light they throw on the history of mediæval culture, but more especially in the important part they played in the diffusion of popular tales (fables, jests, etc.). The Oriental elements brought from Syria by Jacques

de Vitry and others were spread throughout Europe by the host of preachers who incorporated them into their sermons.

Exequa'tur, in international law, permission or recognition given by a foreign authority to consuls and similar commercial agents to perform the special duties delegated to them by their own governments. An exequatur may be withdrawn for reasons judged sufficient by the authorities granting it.

Exeter, capital of Rockingham Co., N. H.; on the Squamscott, 50 m. N. of Boston; founded by Rev. John Wheelwright, 1638; was the capital of the state and a center of military operations in the Revolutionary War; contains the richly endowed Phillips Exeter Academy, Robinson Female Seminary, and manufactures of cotton goods, shoes, pottery, shoe-making and grist mill machinery, and foundry products.

Ex'eter, capital of Devon, England; on the Exe River, 10 m. from the sea, and 170 m. WSW. of London; was the Isca Damnoniorum of the Romans. When Athelstan arrived at Exeter, 926, he found it occupied by Britons and Saxons in common. William the Conqueror appeared before the city in 1068, and founded the castle of Rougemont. Exeter is the see of a bishop, and has the Albert Memorial Museum and a magnificent cathedral, commenced in 1280. In one of the towers is the Great Tom of Exeter, or Peter's bell, which weighs 12,500 lbs. Vessels of 400 tons can ascend the Exe to this place, from which dairy produce, fruits, etc., are exported. Exeter has several nurseries, was at one time the center of a large woolen trade, and is noted for its Honiton lace. Pop. (1901) 47,185.

Exeter Hall, building in the Strand, London, completed in 1831, and since 1880 the headquarters of the Y. M. C. A. As it is used for religious assemblies and meetings of reforming societies, "Exeter Hall" has been used to denote the parties which, even if not fanatical, are apt to advocate a harsh, strict morality.

Exhaus'tion, method of ancient geometry, applied by Archimedes and Euclid, by which the value of an incommensurable quantity was sought by obtaining successive approximations. It aided in the invention of the differential calculus in the seventeenth century.

Ex'ile, condition of a person who either voluntarily or by penal sentence absents himself from his own country in order to escape the consequences to life, liberty, or property that residence at home would bring with it; also, the person who so absents himself. The Greeks were familiar with voluntary exile on account of involuntary homicide, with ostracism, a political contrivance, especially at Athens, to get rid of a powerful party leader, and with exile especially for life. At Rome, while the republic lasted, a person, before sentence for crime, could go to a foreign country; and there were even treaties with certain states by virtue of which Romans, and *vice versa* citizens of such states, had a liberty conceded to them of living in exile in each other's country. Exile was also a penalty for certain crimes, or, as in the case of Cicero, was decreed by vote of the *comita,* or assembly of citizens.

Under the empire the forms of exile in use went by the names of *relegatio* and *deportatio.* Relegation either excluded the person affected by it from a particular place or territory, or it required him to reside at a particular place or within a particular country, without depriving him of property, citizenship, or a father's power, and did not necessarily prevent his return. Deportation, called also deportation to an island, involved loss of citizenship and of property. Exile is as a punishment unknown to English law, unless it be in the form of transportation by Act of Parliament, or as a condition of release by the executive from a capital or other severe punishment.

Free countries, unless overawed by superior power, have generally given refuge to political exiles, and seldom have they delivered them up on demand from the exile's country. The connection of the exile with his native land of course ceases. If, as sometimes happens, he engages in plots with accomplices in his native country, he is amenable to the law of his domicile (*i.e.,* the land where he is residing) for any criminal acts he may commit within its jurisdiction. Such a person is sometimes demanded by the authorities of his original home, in order to be tried under its laws; but a free country will refuse to surrender its territorial rights in such cases. See EXTRADITION.

Ex'moor For'est, district of England, partly in Devon and partly in Somerset; mostly uncultivated, and occupied by dark ranges of hills and lonely valleys; is partly covered with heath, and contains considerable meadow land. In this region ponies are bred extensively, and iron is mined.

Ex'odus (Greek "a going forth"), migration, whether by compulsion or otherwise, of any considerable body of people, as of the Moors from Spain, 1492, of the Huguenots from France after the revocation of the Edict of Nantes, 1685, or of the Irish to the U. S. since 1847; but the term is commonly applied almost exclusively to the departure of the Israelites from Egypt under the leadership of Moses. From the biblical narrative it is not quite clear how long they had been in Egypt—whether four centuries, or only a little more than two; but the probability is that their sojourn there was for a period of about two hundred and fifty-five years.

The date of the exodus, in years of the Christian Era, is a matter of conjecture. Usher places it abt. 1490 B.C. A more correct computation from the Bible numerals might make it some decades earlier. The date now most commonly received is abt. 1320 B.C., but this is in conflict with the Bible statements, and is based on really very slight evidence.

Ex'ogens, plants in which the growth of the stem is in concentric layers between the pith and the bark.

Exophthalmic (ĕks-ŏf-thăl'mĭk) **Goi'tre.** See BASEDOW'S DISEASE.

Ex'orcism, rite designed to cast out evil spirits, or withdraw from their influence persons "possessed" or made demoniac by them. Something of the sort has always attended a belief in demoniacal possession. Among the Greeks exorcising was a profession. All early Christian writers bear testimony to the fact that exorcisms were practiced universally in the churches. Christ, who drove out devils himself, committed this power to his disciples, and promised that it should be exercised in the church after him. An order of exorcists still exists in the Greek and Roman Catholic churches. In both the rituals prescribed exorcisms for adult and infant baptism, for allaying storms, checking the ravages of hurtful insects, putting an end to droughts, etc. At the reformation Calvin and Zwingli rejected exorcism in baptism; it was retained by the Lutheran churches, but in time became obsolete.

Exosto'sis, osseous tumor developed on the surface of a bone, originally or eventually continuous with its substance, circumscribed, without interior cavity, having the same structure and life as the bone on which it is found. There are two varieties of this growth: in one the bone, as all other tissues may do, takes on a morbid development, an (overgrowth) hypertrophy of its substance, forming a well-defined tumor on the surface; in the other the new ossific matter is deposited, under or between the laminæ of the periosteum, separated from the bone at first by cartilage, but afterwards becoming consolidated to it in the usual manner of bony processes.

Exoter'ic. See ESOTERIC.

Expan'sion, spreading out; increase of bulk or extent, especially under the action of internal forces; in physics the term sometimes means increase in length or breadth (more properly, elongation or dilatation), sometimes increase of surface, but most frequently increase of volume. An important cause of expansion is rise of temperature, although there are important exceptions to the law, as in the case of vulcanized rubber, of iodide of silver, of water between 0° and 4° C., of the oxide of copper and the diamond at low temperatures, and of iron above a red heat. Elongation per unit of length, when a body is heated 1° C., is its coefficient of linear expansion; increase of bulk per unit of volume, when a body is heated 1°, is the coefficient of cubical expansion. The observed expansion of a liquid or gas within a containing vessel, on heating or cooling, is termed its apparent expansion. The true expansion of the fluid is obtained by correcting for the changed bulk of the vessel. See HEAT.

Expatria'tion, voluntary abandonment of one's native country with the intention of becoming a citizen of another state. According to an act of the U. S. Congress (1868), the act of expatriation is a natural and inherent right of all people. Exceptions to the right are sometimes made, as where the person holds a public trust, or is liable to do military service, or is charged with crime. There are also differences, and sometimes a practical difficulty, as to the mode in which election to abandon citizenship shall be evidenced. In some countries—*e.g.*, France and Prussia—it may be shown by the fact that the person has taken his domicile in a foreign country in such a sense that he has abandoned all intent to return to his former home. British statutes provide that naturalization in a foreign country shall be evidence of an intent to renounce British citizenship. Should the former subject wish at any time to resume his relations with the United Kingdom, he can be naturalized under the laws of that country. The subject of expatriation is not so important as it was formerly, when aliens were subject to serious disabilities.

Expecta'tion Sun'day, Sunday before Whitsunday. According to Acts i, 4, Christ commanded the disciples "that they should not depart from Jerusalem, but wait for the promise of the Father." They waited till the day of Pentecost, and the promise was fulfilled.

Ex'pert Tes'timony, in law, the testimony of expert witnesses, or, as they are commonly called, experts. The practice of introducing experts as witnesses in proceedings at law, for the better determination of the issues, dates back to the Roman Empire, and probably as ancient as the history of man. The province of the ordinary witness is to testify as to actual facts observed; in the case of the expert witness a state of facts is supposed to exist, and, assuming that state of facts actually to have existed, the expert is called upon to state his opinion of the result or proper interpretation of such a state of facts. Generally speaking, also, the expert witness must base his opinion on facts which he has heard proved during the trial of the question in issue. A person is qualified to testify as an expert when it is proved that he has received such a practical education or experience in the matter involved as to enable him to render an intelligent and probably accurate opinion of it in accordance with the rules of the art, profession, or trade to which it pertains. The court passes on the fitness or unfitness of an expert, the decision being subject to the right of the parties to appeal. The two most important fields for expert testimony are the identification of handwriting and questions of medical fact.

Exploits', Riv'er of, river of Newfoundland; traverses nearly the whole breadth of the island from SW. to NE.; is navigable for steamers 12 m. to the rapids, and above these small boats can go to within 50 m. of the SW. coast. Its valley is level, well timbered, and abounds in game and fish, but has few inhabitants.

Explo'sives, compounds practically available in war, in mining, and in general use for the sudden development of immense force. They are classified as *nitrate mixtures,* as gunpowder; *nitrocompounds,* as gun cotton and nitro-

glycerin, with their many derivatives; *chlorate mixtures, picrate mixtures,* and *fulminates.*

Gunpowder, which was first employed in war abt. 1350, is the oldest and most useful explosive. It is a mechanical mixture of potassium, nitrate, carbon, and sulphur, in proportions usually varying but little from seventy-five, thirteen, twelve respectively. It consists of very finely pulverized ingredients, thoroughly incorporated, compressed into a cake, granulated, separated into the different sizes of grain by sieves, glazed, dried, and freed from all dust. The properties of gunpowder may be varied to suit the requirements of a quick-burning or a slow-burning explosive. Its expansive power is due to two distinct causes —the sudden transformation from a solid to a gaseous form of much greater volume, and the heat developed by the chemical change, which induces enormous tension. It follows, therefore, that a variation in the relative proportions and conditions of the ingredients must affect the expansive force; and also that a similar result may be obtained by mechanical means directed to modifying the duration of the time required for combustion.

In 1832 Braconnet discovered that by dissolving starch, paper, wood, or other fibers in nitric acid, and adding water, a white substance was precipitated, to which the name *xyloidin* was given. The explosive nature of this compound, called *gun cotton,* was discovered by Schonbeing in 1845, and at once excited attention as a possible substitute for gunpowder. On account of its liability to spontaneous explosion, its corroding residua, and its excessively violent and irregular character, which unfitted it for most military uses, it was soon disregarded. Gun cotton produces little smoke, and leaves a very small residuum of solid matter. It is unalterable in water. *Smokeless powders* are derived from gun cotton, treated by solvents, as acetone or an ether, either in a liquid or gaseous form according to the object in view, yielding a colloid mass which may be subdivided into grains of the size required. The conversion of wood fiber into an explosive similar to gun cotton resulted in the discovery of *Schultze* powder, which burns with but little solid residuum or smoke, and is said to be both cheaper and stronger than common gunpowder, weight for weight, although more bulky. *Nitroglycerin,* or *glonoin oil,* discovered in 1847 by Ascagne Sobrero, remained unapplied to practical uses until 1864, when Alfred Nobel, a Swedish engineer, developed its industrial value. It is prepared by the action of nitric and sulphuric acids upon glycerin. At ordinary temperatures it is an oily, odorless, sweet, and slightly pungent liquid. It is highly poisonous. Nitroglycerin incompletely freed from the acids undergoes spontaneous decomposition, is dangerous to handle, and ultimately may lose its explosive properties. These properties have led to its abandonment as an explosive.

Dynamite, now the generic name of a class of explosives, was invented in 1866 by Nobel. It first consisted of nitroglycerin absorbed by a porous, inert solid. The best material is a siliceous infusorial earth known as *kieselguhr,* which will absorb and safely retain three times its weight of nitroglycerin. Dynamite has the appearance and consistence of heavy brown sugar. It possesses most of the virtues of nitroglycerin, and is exempt from liability to spontaneous explosion and to detonation from moderate shocks, because of the exceedingly fine granulation of the nitroglycerin. Saturated with water it loses a very small percentage of its explosive power, but requires a primer much more powerful than those ordinarily used. Ignited by a flame, and unconfined, it burns quietly without detonation.

Glyoxaline was invented by Abel shortly after the introduction of dynamite. It consisted of a mixture of gun-cotton pulp and potassium nitrate, saturated with nitroglycerin, and was made both in a granular and a cake form. *Lithofracteur* is a variety of dynamite devised by Engels. It consists of nitroglycerin, silica, and mineral bodies as absorbents. It is a pasty substance of dark color; it burns quietly when ignited by a flame, and explodes violently when fired by a detonating fuse. It was employed by the Germans in the war with France in 1870–71. In the U. S. the type is represented by *Judson powder. Dualin* was invented by Dittmar, and its use has been chiefly restricted to Germany and the U. S. It consists of nitroglycerin mixed with sawdust and potassium nitrate in proportions necessitated by its various uses. In 1875 Nobel patented a nitroglycerin compound, variously known as *nitrogelatin, blasting gelatin,* or *explosive gelatin.* It consists of from five to eight per cent of carefully prepared gun cotton. In appearance nitrogelatin is a pale-yellow, elastic, translucent jelly. Its sensitiveness is increased by cold. It is wholly unaffected by water. The addition of from three to five per cent of camphor forms *gelatine explosive de guerre,* and materially reduces its sensitiveness to high temperatures, and to shocks. Strong detonators are required to develop full power.

The Austrian explosive *ecrasite,* which is claimed to have given remarkable results as a charge for shells, is believed to be a modified blasting gelatin. By the addition of nitrates, with or without carbon, gelatin dynamites of various grades are formed for use when reduced intensity of action will suffice. When the proportion of nitrocellulose is increased to about fifty per cent, and of camphor to about ten per cent, a hornlike substance is produced, known as *ballistite.* Rolled into sheets and suitably subdivided, it forms smokeless powder, giving good results both in small arms and in cannon. *Cordite,* which is also a smokeless powder, belongs to this class, as does also *Leonard powder. Forcite* is an American representative of the class of gelatinized nitrocompounds to which nitrogelatin belongs. Several grades are on the market. The strongest contains ninety-five parts by weight of nitroglycerin and five parts of a prepared cellulose of a special kind. By adding nitrates in varying proportions forcite dynamites are formed. They contain from seventy-five per cent to thirty per cent of nitroglycerin.

The violent action of potassium chlorate upon readily oxidizable substances has led to

many attempts to use it in making substitutes for gunpowder. Under the names of *white gunpowder* and *German gunpowder*, a mixture of this salt with potassium ferro- and ferricyanide and sugar has been long known. Mixed with nut galls, resins, and other vegetable substances, it has been sold as *Horsley's powder*, *Ehrhardt's powder*, etc. The form best known in the U. S. consists of potassium chlorate, potassium nitrate, and crude gamboge, which was considerably employed for blasting purposes. In 1873 Sprengel described a new class of explosives formed by mixing just before use an oxidizing and a combustible ingredient, each of which by itself is nonexplosive. *Hellhoffite*, consisting of nitric acid and *metadinitrobenzene*, is a variety of the Sprengel class introduced by Gruson for use in shells. In France these explosives are called *panclastites*. In the U. S., *rackarock*, composed of potassium chlorate and nitrobenzene, was used in the destruction of Flood Rock, New York harbor, in 1885. This explosive, being composed of a liquid and a solid, is not dangerously sensitive to friction when fresh, and before mixing is absolutely safe to handle, transport, or store in any quantities. Designolle mixed potassium picrate with charcoal and potassium nitrate, forming a compound similar to, but more powerful than, ordinary gunpowder.

Brugière powder is a mixture of ammonium picrate and potassium nitrate. It is a comparatively slow powder, less liable to attract moisture than ordinary gunpowder, and yields but little smoke. In England, Abel experimented with a similar compound, to which he gave the name of *lyddite*, regarded as especially suited for use in shells, because its effects when strongly confined are more violent than those of gunpowder. To the class of picrates belongs mélinite, said to be fused picric acid and nitrocellulose dissolved in ether. The violent action and sensitiveness of fulminates restrict their use to a limited field. The most important among them is mercuric fulminate, the best agent known for inducing detonation in all high explosives, used alone or mixed with potassium chlorate. Silver fulminate is used in minute quantities in toy fireworks. Copper fulminate is excessively sensitive to frictional electricity, being readily fired by sparks far beyond the cognizance of touch. See PROJECTILES; ARTILLERY.

Expo'nent, in algebra, a number or symbol representing a number which, written above and at the right hand of any symbol of quantity, indicates a corresponding power of that quantity. Thus a^3 denotes the third power of a, and 3 is said to be the exponent or index of that power; usually, though less correctly, it is called the exponent of a.

Exponen'tial Equa'tion. See EQUATION.

Ex'ports. See COMMERCE.

Exposi'tions, great public exhibitions which have been held, since the middle of the nineteenth century, in various countries, of the products of the industry and of the evidences of culture, intellectual and æsthetic, of all nations. Public exhibitions of the products of industry were first held as marts or fairs. The earliest held for purposes not strictly commercial, but for the promotion of improvements in the useful arts, were instituted by the Society of Arts in London, which has held such exhibitions annually since 1760. The first properly national exhibition of this kind was held in France in 1798, and since then the French Govt. has promoted or given a similar exhibition every few years. In the U. S. exhibitions for the encouragement of agricultural or mechanical industry have long been held under state, county, and society organizations, with more or less aid from state and municipal governments.

The first international exposition, or exhibition of the industries of all nations, was held in London, 1851, where the first Crystal Palace was erected. The exhibitors numbered about 15,000; the visitors, nearly 6,064,000. It was a financial success, and stimulated similar undertakings elsewhere; and led especially to the first great one in the U. S., held in New York, 1853, in a single building, called the Crystal Palace. This was organized on a stock-company basis, and was a financial failure. In the same year the Royal Society of Dublin, which had been holding exhibitions triennially, held one of international scope. The Paris Exposition of 1855 was the first in France to be thrown open to the world. It was a private undertaking on a government guarantee against loss, and was the first with a main and subordinate buildings; the former is preserved, under the name of the Palais de l'Industrie. There were 20,839 exhibitors and 4,533,464 visitors.

The second London exposition was held at South Kensington, 1862, under a commission with a guaranteed fund. It had 17,861 foreign exhibitors and 6,211,103 visitors. Its main building, the "Alexandra Palace" was later removed, and was destroyed by fire, 1873. As effects of the first London undertaking, industrial and art displays were held in New Brunswick and Madras, 1853; Munich, 1854; and Edinburgh and Manchester, 1857. The Paris Exposition of 1867 was the most colossal in all particulars of all held up to that time. The principal exhibition was held on the Champ de Mars, the large parade ground in front of the École Militaire, containing about 111 acres; other departments were accommodated on the banks of the Seine, and at Fouilleuse and Vincennes. This exposition would have shown a financial loss had it not been for national and municipal aid. The exhibitors numbered 51,819; visitors, upward of 15,000,000, counting readmissions. London held a series of expositions, 1871, 1872, 1873, each devoted to a distinct branch of industrial effort, the first of this character ever held. Vienna held its first international exhibition in the famous Prater, 1873, and, though it surpassed all predecessors in grandeur, it entailed a great financial loss because of local extortions, a financial crisis, and an epidemic of cholera. There were 70,000 exhibitors and 7,254,687 registered visitors.

International expositions in the U. S. as a rule have been held in commemoration of some

great national event. The first on a really grand scale was the Centennial Exposition in Philadelphia, 1876, celebrating the hundredth anniversary of American independence. The exhibition represented an outlay of $20,000,000, had 30,864 exhibitors, and 10,164,489 visitors, and was in all respects successful. A feature of this exposition was the observance of state days, when the governors and large representations of the several states visited the grounds, and held special exercises in the state buildings. The Memorial and Horticultural halls were built for permanent structures by the State of Pennsylvania and the city of Philadelphia respectively. Between this and the next really great American exposition, there were held: one in Paris, 1878, which had 80,000 exhibitors and over 16,000,000 visitors; one in Atlanta, Ga., 1881; one in Louisville, Ky., 1883; one in New Orleans, commemorating the centennial of the first export of cotton from America, 1884–85, with the special features of displays of woman's work and that of the colored race; and one in Paris, commemorating the centennial of the French Revolution, 1889, which, being political, had comparatively slight foreign representation.

The second great American exposition was the World's Columbian Exposition, held in Chicago, 1893, and commemorating the discovery of America by Columbus. Because of its magnitude and consequent delays it was not opened in the centennial year of discovery, although the grounds were turned over to the National Commission and dedicatory exercises were held October 23, 1892, corresponding to October 12th, old style—October 12, 1492, being the day on which Columbus first sighted land in the New World. It was closed earlier than the date appointed because of the assassination of the mayor, Carter Harrison, October 28, 1893. A feature of this exposition was the large number of international congresses, and the great use of "staff" in the construction of the buildings, making on the grounds a veritable "white city." The exhibitors numbered 65,422; paid admissions, 21,477,218; entire cost of construction, $18,322,622. The Fine Arts Building was preserved, and is now known as the Field Columbian Museum. As a counter attraction to the Eiffel Tower of the Paris Exposition, Chicago had the Ferris wheel. Then followed in the U. S. the Cotton States and International Exposition, held in Atlanta, Ga., 1895, to give a more adequate display of the industries of the South than was possible at Chicago; one at Nashville, 1897, commemorating the centennial of the admission of Tennessee into the Union; one at Omaha, Neb., to commemorate the achievements of the pioneers of the trans-Mississippi Valley, 1898; and an Export Exposition and World's Commercial Congress, the first of its kind, in Philadelphia, 1899.

Paris held another exposition, 1900, in which the U. S. led the world in awards for its electrical, transportation, and mining and metallurgical exhibits. Over 50,000,000 paying visitors passed through its gates. A South Carolina Interstate and West Indian Exposition was held in Charleston, 1901–2; but the larger interest of that period was taken in the Pan-American Exposition, held in Buffalo, 1901, and saddened by the assassination of President McKinley (September 6th). This exposition was distinguished from all its predecessors in having the greatest and most varied electrical display ever seen. Financially, it was a failure. Of later expositions in the U. S., that at St. Louis, 1904, commemorated the Louisiana Purchase of 1803; that at Portland, Ore., 1905, the centennial of the Lewis and Clark expedition; and that at Jamestown, Va., 1907, the tercentennial of the first English settlement in America, and the Alaska-Yukon-Pacific Exposition, 1909, designed to exploit the natural resources of Alaska and development of trade and commerce on the Pacific coast.

Exposi'tions, Per'manent, strictly, museums opened in various countries within recent years to promote commercial interests. The best type in the U. S. is the Commercial Museum in Philadelphia, supported by the city and by subscribers. Its quarters are filled with exhibits arranged by countries showing the foreign goods exported to lands where U. S. goods meet them in competition. If a Connecticut cutlery maker wishes to extend his trade to Australia, he may learn at this museum the quality, shape, and prices of the sheep shears and all other varieties of cutlery that are sold in Australian markets. It is also a function of the museum to supply the latest information as to the nature of commodities, tariffs, and local demands and conditions in all countries.

The Commercial Museum at Brussels contains only manufactured articles made in other lands, and brought together so that home manufacturers, by studying them, may compete more intelligently in foreign markets. This museum was so speedily successful that others were started in other cities of Belgium. Stimulated by the success of the Belgian museums, France has established these institutions in her principal manufacturing and commercial centers, and they are regarded as most successful. Other commercial museums, some of them supported by private enterprise, and others to a greater or less extent by governments, have been established in Vienna, Berlin, Stuttgart, Berne, Milan, and Rome. The Japanese Govt. has opened a commercial museum at Osaka to afford a central place for the exhibition of native and foreign products. In order to familiarize other countries with U. S. products, the National Association of Manufacturers has undertaken to establish what it calls American sample warehouses at various foreign centers. The first of these was opened at Caracas, Venezuela, in 1898, with a great variety of exhibits representing sixty-one U. S. manufacturing industries.

Ex post fac'to, legal term transferred from the civil to the common law. An *ex post facto* law is a law that operates by after-enactments. By the Constitution of the U. S., neither Congress nor the State Legislatures can pass *ex post facto* laws. The meaning of the term thus used has often been defined, and is fully settled by judicial decisions. It refers

to criminal and penal statutes only, and not to those which simply affect private property. Chief Justice Marshall defined an *ex post facto* law to be one which rendered an act punishable in a manner in which it was not punishable when it was committed.

Exterritorial'ity, that legal fiction which permits to certain persons or classes of persons who may be in a foreign land exemption from its jurisdiction. The laws of their own country therefore still govern them as if they had never left it. The classes of persons to whom these privileges may be granted are five, *viz.*: (1) Sovereigns. By the courtesy of nations these, with their suites, are not subject to local jurisdiction, but their entrance may be refused or this privilege withdrawn. If they own real property in a foreign country, that is not exempt from taxation. (2) Public armed vessels. A merchant ship on the high seas is governed by the laws of its own country; in a foreign port by the laws of that state; but a man-of-war in a foreign port applies the jurisdiction of its own country to its own crew on board. On shore, however, they are amenable to the local law. (3) Armies in transit. When such transit is permitted, the army will be governed by its own officers, and its own military law will be in force. It is to be remarked that such transit is most unusual, and if granted in time of war, or in preparation for war, would amount to a breach of neutrality. (4) Ambassadors, diplomatic agents, and consuls in certain countries. (5) Foreigners resident in certain Oriental states. Where the laws, usages, judicial system, and state of civilization in a country differ greatly from the European standard, and fail in affording protection to person and property of resident foreigners, the latter may be allowed, by treaty stipulation, to remain under the jurisdiction of their own laws, though frequently subject to conditions as to behavior or residence. The U. S. has treaties securing to its citizens such privileges with Borneo, China, Korea, Madagascar, Persia, Turkey, Siam, Tonga, and Zanzibar, and to a less degree with certain of the Barbary states.

Ex'tract, in pharmacy, any solid substance (called simply an extract) or liquid substance (fluid extract) made by evaporating solutions containing medicinal principles, chiefly of vegetable origin. These solutions are made (1) by pressing out the juices of fresh plants, or of dried ones after steeping, by means of hydraulic or other presses; (2) by means of liquid solvents, as water, alcohol, or ether, from which result "aqueous," "alcoholic," and "ethereal" extracts—some extracts being better prepared by one and some by another process. Sometimes the fluid used to dissolve the drug is allowed slowly to flow repeatedly through the powdered drug, the solvent being at last removed by evaporation or distillation. Evaporation is frequently carried on in a vacuum with advantage, for a high degree of heat is injurious to many vegetable principles.

Extract of meat is a preparation of beef, and sometimes of mutton, or of both combined, in which the muscular fiber, fat, and gelatin are removed, and the highly nitrogenous elements preserved and condensed into a semisolid mass of about the consistence of butter. Commercial extract of beef is prepared on a large scale in the Argentine Republic, in Texas, and elsewhere. Most of what is sold in Europe and the U. S. comes from Buenos Ayres, where its manufacture was first established under the supervision of the chemist Liebig. One establishment at Fray Bentos slaughters 400 oxen daily. In general the finely cut beef is allowed to stand for a few hours in cold water; the liquid is then boiled for a time, and afterwards evaporated in a vacuum pan. In some places the mince-meat is steamed, and the resulting liquids evaporated on rapidly revolving steel plates. In other establishments superheated steam is employed under pressure; the material is then submitted to powerful hydraulic compression, and the expressed liquid partially dried in a vacuum.

Extradi'tion, surrender of fugitives from justice by the authorities of one country or state to those of another. (1) Between the states of the American Union. This is provided for by the Constitution, which declares that a person charged in any state with crime, who shall flee from justice and be found in another state, shall, on demand of the executive authority of the state from which he fled, be delivered up to be removed to the state having jurisdiction of the same. Under the act of Congress passed to carry this provision into effect, and the statutes of the several states on the same subject, the general course is as follows: The accused is either indicted in the state where the crime is alleged to have been committed, or he is charged with the offense before a magistrate, who, after examining into the case, and being satisfied by evidence that the charge is well founded, issues his warrant for the arrest. A copy of the indictment or warrant is then presented to the executive of that state, who will give a formal requisition on the executive of the state to which the accused has fled for his surrender. The executive on whom the requisition is made, if the papers appear to be regular and sufficient, issues his warrant in compliance, directed to an officer or to the agent of the state making the requisition, which will be authority for the apprehension and removal of the accused.

(2) Between sovereign nations. Though the extradition of offenders has been practiced by some nations on grounds of comity only, this is usually reënforced either by legislation, where a country provides by its own laws that persons accused of offenses abroad shall be subject to extradition on condition of reciprocity; or by convention or treaty, which is the method commonly adopted. It is customary to provide that such treaties shall not apply to offenses previously committed or to those of a political character. The U. S. Govt. has taken the lead in diplomatic negotiations on this subject. Jay's Treaty of 1794 provided for the mutual rendition by the U. S. and Great Britain of persons accused of murder and forgery; in addition to which the treaty of August 9, 1842, embraces assault with intent

to commit murder, piracy, arson, robbery, and the utterance (offering in a transaction) of forged paper. In 1876 the operation of this treaty was temporarily suspended, because the British authorities asked an assurance from the U. S. that a person should not be tried for any other offense than that mentioned in the demand for his surrender. The request was subsequently withdrawn by the British Govt.

The U. S. has extradition treaties with all the great powers, and with many of the minor states of the world; hence it is exceedingly difficult for a fugitive from it, charged with an extraditable offense, to find a safe asylum anywhere. The treaties are not identical, though of the same general scope and character. They all include the more heinous crimes, such as murder and piracy, while some of them embrace robbery, burglary, arson, rape, embezzlement, and the fabrication and circulation of counterfeit coin or paper. In recent years, in view of the large number of anarchist atrocities, an almost universal sentiment has developed in favor of enlarging the scope of extradition treaties so as to include within their provisions persons attempting or effecting the death of a sovereign or chief executive, and also habitual anarchist agitators, the latter on the ground of their being a menace to the peace of any state.

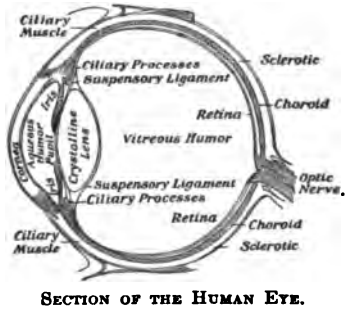
Extraterritorial'ity. See EXTERRITORIALITY.

Extravagan'za, in music, the drama, etc., a species of composition designed to produce effect by its wild irregularity and incoherence; differing from a burlesque in being an original composition and not a mere travesty.

Extreme' Unc'tion, sacrament of the Roman Catholic, Greek, and Oriental churches, administered for the spiritual and bodily relief of the dying. The Scriptural authority is found in Jas. v, 14, 15. It is administered by the priest, who anoints with consecrated oil the eyes, ears, nostrils, mouth, hands, and feet of the sick person, with prayer for the remission of sins committed by each physical sense.

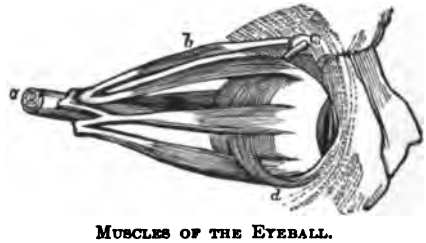
Eyck (īk), **Van,** the name of three painters, two brothers and a sister, regarded as the founders of the Flemish school. HUBERT (1366–1426) resided some time at Bruges, and removed to Ghent with his brother, whom he probably instructed. JAN—often called JAN VAN BRUGGE (abt. 1390–abt. 1440). The most celebrated work of the brothers was the altarpiece in the Church of St. Bavon, Ghent; about 14 ft. wide and 12 ft. high, and contained twelve pictures, painted on folding doors or screens, representing the adoration of the mystical lamb. Napoleon caused the doors to be carried to Paris, whence they were removed in 1815. The four central divisions are now in the Church of St. Bavon; the six most important of the doors are in the Royal Museum at Berlin; and two of the doors are in the Museum of Brussels. The brothers made such improvements in the art of oil painting that its invention has been often, though erroneously, ascribed to them. Jan was the court painter of Philip the Good, Duke of Burgundy, and after the completion of the altarpiece in 1432 returned to Bruges. MARGARET d. abt. 1430; worked with her brothers. There is in the National Gallery, London, a fine picture by her, in three parts, of the Madonna and child.

Eye, The, and Vis'ion, respectively the organ of sight and the effect of that organ's action. The direct cause of the perception in normal vision is the action of waves of light on the finely branched ends of the optic nerve. The sensation of seeing may be produced by other agencies besides the ordinary one of radiant energy. An electrical current passed through



SECTION OF THE HUMAN EYE.

the eye produces the sensation of a flash of light. A blow upon the eye causes the recipient to "see stars." Poison in the system, as alcohol or opium, or mere fever, may induce spectral images that are as real to the sufferer as if occasioned from outside. Pressure on the eyeball produces "phosphenes," visions of successively changing color that may last several minutes. If the gaze be fixed for half a minute on an object that is sharply defined and well lighted, then on changing the direction of the visual line a complementary "after image" comes into view, and may last some seconds, even in absolute darkness. Whatever is capable of exciting the optic nerve can produce the impression of light; and radiant en-



MUSCLES OF THE EYEBALL.

ergy of special wave length is only one of many such agencies. But the optic nerve is the only one which this special mode of energy seems capable of exciting.

The eye, nearly round in shape, rests on a fatty cushion within a bony socket. The outer covering of the eyeball is tough and fibrous, and is known as the sclerotic coat. To its exterior are attached six muscles, which oppose each other by pairs, and by means of which motion is given about a vertical axis, a hori-

zontal axis, and a slightly oblique axis. The front of the sclerotic forms the visible white of the eye. About the center of this is a portion slightly more protuberant than the rest, and quite transparent; it is the cornea. Within the sclerotic is a second coat, the choroid, which is dark in tint and nearly covered with a network of blood vessels and nerve fibers. Its continuation in front beneath the cornea is a colored curtain, the iris, perforated with a central opening, the pupil. This curtain is provided with two sets of muscular fibers, and

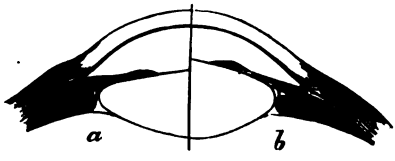


ILLUSTRATION SHOWING CHANGE IN THE FORM OF THE LENS WHEN ADJUSTED.

by variation in the tension of these the size of the opening is varied, and the quantity of light admitted to the eye is controlled. The space within the globular chamber is filled with transparent matter, which with the cornea serves as a lens. This matter is varied both in consistency and in density. Most of it is jelly-like, and has the name of vitreous humor. The portion just behind the cornea is thin and mobile like water, and is hence called aqueous humor. Between the aqueous and vitreous humors is the crystalline lens, made up of transparent layers which increase in density from surface to center. It is moreover elastic, so that its form is modified by varying the contraction of the ciliary muscle. The eye is protected in front by the curtain formed by the eyelids, which by their movements clean the front of the eye by distributing over it the lachrymal or tear fluid.

From the elementary principles of refraction it is obvious that the image thrown upon the back part of the eye must be inverted. But the brain correctly interprets the retinal image, seeing it right side up. A child with good vision secures a distinct image of an object only 3 or 4 in. in front of the face with apparently as much ease as when the object is remote. Sixty years afterwards the same person finds it impossible to obtain distinct vision of an object a yard away without the aid of spectacles. When the eye is changed to secure distinct vision of a near object, the surface of the cornea remains unchanged, but the convexity of the front of the crystalline is increased, while that of its rear is but slightly affected. When the ciliary muscle contracts, the lens in virtue of its own elasticity becomes more convex than when the eye is not acting. Its converging power is thus increased, and the adaptation for near objects is hence effected. During childhood the crystalline is soft, and it responds readily to variations of tension. With the lapse of time it gradually hardens, so that during old age no effort of the ciliary muscles is sufficient to modify its form. The power of accommodation is then lost, and increase of converging power is attained only by the use of convex glasses. The distance at which distinct vision is most comfortable for the normal eye is ordinarily assumed to be 10 in. For a child of ten years, the distance of the "near point" of distinct normal vision is about 3 in.; for a man of forty-five years, 12 in.

The retina is the membranous expansion of the optic nerve spread over the inner surface of the choroid coat. On the outer side of the entrance of the optic nerve is a small area which, from its color, is named the yellow spot. At its center is a minute depression, called the *fovea centralis*. This pit is remarkable on several accounts; through it passes the optical axis of the lens system, and therefore upon it is focused the image of any bright point to which the attention is directed. Here it is that the most exact discrimination of distances is made, and here the sensitiveness to color is a maximum, while the sensitiveness to light is less than in the surrounding neighborhood. In marked contrast with the yellow spot is the end of the nerve cable where the optic nerve enters the eye which is incapable of impressions of light. The blindness of this fibrous bundle is easily tested. Let the left eye be directed to the cross in the accompanying cut, while the right is closed, the line connecting the two pupils being parallel to the lines of print. Keeping the point of fixation constant, the black circle at the right is seen, by indirect vision, but it disappears when the interval between eye and page is 7 to 12 in.

The eye is very faulty if judged by the standards applied in the construction of optical instruments. Considering it as a camera, the receiving plate of this should be uniformly sensitized, and its lens system should be free from errors of refraction. The retinal receiving plate comes far short of fulfilling the requisitions of optical science. The retinal blood vessels, moreover, sometimes cause shadows which may be projected outward and made perceptible. Similarly, shadows may be outwardly projected, due to fibers, streaks, and clots in the vitreous humor. Besides these minor defects, the material composing the cornea and crystalline lens is not uniformly clear, and their surfaces are not regular. Fibers and spots in the crystalline obstruct the light transmitted. This lens is an aggregation of layers, whose fibers are arranged around six



TEST TO LOCATE THE "BLIND SPOT."

or more axes that render uniformity of structure impossible. A beam from a luminous point, therefore, is not accurately focalized to a point, but to a line, or group of intersecting lines, or an irregular small area. The stars on this account, though practically infinitely distant, appear not as points of light, but more or less radiated in form. These imperfections cause perceptible astigmatism in nearly all eyes. Light coming from a point nearer than that of distinct vision is projected on the retina, not as a diffusion circle, but as a surface with irregular outline, often roughly elliptic.

Artificial lenses are usually made of glass clearer than the media of the eye, and with surfaces whose curvature is spherical. With such a single lens it is impossible to bring a sheaf of parallel rays accurately to a single focus, for both spherical and chromatic aberration need to be corrected. The refracting media of the eye are provided with no arrangement for the correction of either spherical or chromatic aberration. These defects belong to all human eyes, but are usually not noticed, because test conditions are not involved in ordinary natural vision. What the eye ordinarily sees is that small part of the field of view upon which the attention is fixed. Standards of comparison are needed in order to become aware of defects of any kind. Those of the eye are largely offset by its capacity for rapid motion in its orbit. In beholding any object we habitually direct the visual line to various parts of it in succession, and thus secure the best image of each that is possible under the circumstances. Every portion of it is quickly focalized on the most sensitive part of the retina. Variations of accommodation, moreover, are accomplished by the eye many times more quickly than is possible with any other optical instrument. Letters and numerals are now universally employed as tests in measuring sharpness of vision. For examination the subject is placed 20 ft. away in front of various sizes of test type well illuminated. The size of the smallest type that he can read correctly affords the means of expressing his sharpness of vision in comparison with that of the normal eye. If he reads the test type with each eye at 20 ft., his vision is rated $\frac{20}{20}$; if one eye reads it at 18 ft., the vision is $\frac{18}{20}$ if the other eye is normal. After defective vision has been detected by the use of the test type, it remains to determine the nature of the defects. The oculist tries upon the subject a variety of glasses, convex, concave, and cylindrical, of diminishing curvature, to ascertain which of these, or what combination of them, effects the greatest improvement.

The chief defects of vision are: (1) Near sightedness, or *myopia*, which may be remedied by the use of concave glasses of proper focal length. (2) Far sightedness, or *hyperopia*, which may be remedied by the use of convex glasses. (3) Astigmatism, which is due chiefly to unequal curvature of the cornea in different planes, may be regarded as *hyperopia* or *myopia* in a particular plane. The remedy is to wear a convex cylindrical glass, whose curvature is so adjusted as to collect the rays sufficiently in a vertical plane without affecting those in a horizontal plane. (4) Old sightedness, or *presbyopia*, due to the hardening and unequal shrinking of the crystalline, developed during old age. The distance of the near point of distinct vision becomes inconveniently great, so that convex glasses are needed for vision of near objects, as in reading. This necessity generally does not exist for those who are naturally near sighted, but for such persons concave glasses are still needed for vision of distant objects.

For distances in excess of a few hundred feet it makes little difference whether vision is with one eye or both if the illumination is good. But if an object is quite near—*e.g.*, a few feet or inches away—a new important element is introduced. Each eye occupies a standpoint different from that of the other, and therefore the retinal pictures are different, but cover very nearly the same retinal areas. On the whole, the impression carried to the brain is that of a single object, but the right eye sees more of its right side, the left eye more of its left side; and both eyes equally see the side directly turned toward the observer's face, but at different angles. Let two pencils be held vertically in front of the face, one behind the other, with an interval of a few inches between them and a bright surface, such as a white wall, for a background. When the gaze is fixed upon the nearer pencil the farther one is by indirect vision seen double, so that the impression is that of three pencils. Or, if the gaze is on the farther pencil, then the nearer one is seen double. See OPHTHALMOLOGY; SENSATION; SENSES.

Eye'bolt, on ships, a metal bolt screwed into the timbers or set up with washer and nut, with an eye in the outer end in which a block may be hooked.

Eye'bright. See EUPHRASY.

Eye Glass'es. See SPECTACLES.

Eye'stone, popular name of either of two semicircular calcareous concretions found in the common European crawfish, between the inner and outer coats of the stomach. Placed on a smooth plate in a weak acid, as lemon juice, the evolution of carbonic-acid gas from the carbonate of lime of which it is composed causes the stone to move as if alive. Being introduced under the eyelid, it moves about by the motion of the organ, and any particles it comes in contact with adhere to it and are finally removed with it, a method which is entirely to be condemned.

Eylau (ī'low), or **Ei'lau**, small town of Prussia, on the Pasmar, 22 m. SSE. of Königsberg. An important battle was fought here, February 7 and 8, 1807, between the French under Napoleon and the Russians and Prussians under Bennigsen. The aggregate loss was nearly 40,000. Both sides claimed the victory.

Eyre (âr), **Edward John**, 1815–1901; English administrator; b. York; emigrated to Australia abt. 1833, and began, 1840, the exploration of the unknown region between South Australia and Western Australia. In this

sterile region he performed a journey of nearly 1,000 m. almost alone. He published in 1845 "Discoveries in Central Australia." In 1862 he was appointed Governor of Jamaica, where he suppressed an insurrection, 1865; was censured and removed from office for the execution of Gordon by courtmartial. John Stuart Mill and others took measures to try him for murder, but failed, Eyre being justified or excused by the British public. In 1872 the costs of his defense were refunded by the government.

Eze'kiel (Hebrew "God will strengthen"), third of the great Hebrew prophets, and author of a canonical Old Testament book, contemporary with Jeremiah and Daniel, lived in the seventh and sixth centuries B.C. In his youth he went into captivity with Jehoiachin, during his exile foretold the further misfortunes of his people, and twenty years afterwards described their coming redemption. His book abounds in visions, poetical images, and allegories.

E'zion-ge'ber, or Ezion-gaber, ancient port on the Elanitic arm of the Red Sea, from which Solomon sent a fleet to Ophir, and King Jehoshaphat also built ships here for the same destination. It probably stood near Elath, and is thought by many to have been at the NW. extremity of the Gulf of Akabah.

Ez'ra, Jewish scribe and priest, also author of an Old Testament book; led the second expedition of the Jews from Babylon to Palestine, under the reign of Artaxerxes, abt. 458 B.C., and afterwards collected the books and settled the canon of Scripture; on account of these services he is regarded as the second founder of the nation. Besides the book of Ezra, the book of Nehemiah has been attributed to him. In some ancient MSS. there are four books of Ezra.

Ezzelino (ĕt-zĕ-lē'nō), **or Eccelino** (āt-chĕ-lē'nō), 1194–1259; leader of the Ghibellines in Italy; known in history as Ezzelino the Tyrant. His seat was the castle of Romano near Padua. His lands N. of the Po being ravaged by the Guelphs, he invited the help of the Emperor Frederick II, who relieved him. In 1236 Ezzelino gained possession of Verona and Vicenza, and in 1237 took Padua. He captured Treviso, and from this time his oppression and cruelty were conspicuous. By 1250, when the emperor died, he had extended his control from the Adriatic to the suburbs of Milan. Several leagues were formed against him, and in 1259 he was defeated and captured near Soncino.

F

F, sixth letter of the English and Latin, twentieth of the Arabic, and twenty-third of the Persian alphabet; indicates a labiodental sound; represented in ancient Greek both by *φ* (*ph*) and the digamma (F, *vau*) in corresponding words. The Italians, Spaniards, and Portuguese uniformly replace the Greek *φ* by F. In the present so-called Hebrew, as in the Syriac, Sabæic, Palmyrenic, and some other kindred writings, the *vav* or *vau* takes the place of F, and indicates the sounds of *v* and *u*. The sound of F exists in the Chinese and Japanese, but is wanting in most American languages. See ABBREVIATIONS.

F, in music, the fourth degree in the ascending scale of C, major or minor, being the subdominant in that scale. The base or F clef is placed on the fourth line of the staff, hence as a note on that line is called F, the other notes, above and below, take their names accordingly. The letter F, or *f*, is also used for *forte*, loud; and FF, or *ff*, for *fortissimo*, very loud.

Fa'ber, Frederick William, 1814–63; English clergyman and hymnologist; b. Calverley; became Vicar of Elton, 1843; joined the Roman Catholic Church, 1847; founded the Oratory of the Brotherhood of St. Philip Neri in London, 1849; removed with it to Brompton, 1854; author of the hymns "Hark, Hark My Soul!" "O Paradise! O Paradise!" "Sweet Saviour Bless Us ere We Go."

Fabi'ola, d. 399 A.D.; Roman matron of the Fabian gens, who founded the first Christian hospital in Rome. After being divorced from her worthless husband she married another; but after his death she came to consider her course sinful, and after public penance devoted her wealth and her time to the care of the sick.

Fa'bius Max'imus Verruco'sus, Quintus (surnamed CUNCTATOR), Roman consul; attained the consulate for the first time, 233 B.C.; in the second Punic War he was appointed dictator, 217. Contending against Hannibal the Carthaginian, he adhered so closely to the policy of defensive warfare that his opponent could gain no advantage, and his successes of this sort, long continued, secured for him his surname, meaning "the delayer." This policy of delay has become proverbial as the "Fabian policy."

Fabius Pic'tor, Quintus, earliest Roman historian; a member of the patrician family of the Fabii; lived at the time of the second Punic War (begun 218 B.C.), though the dates of his birth and death are unknown. The last distinct notice of him is that of his being an ambassador to Delphi after the battle of Cannæ, 216 B.C. He wrote a history or annals of Rome from the early settlement of the city to his own times, and his work is often quoted by Livy, Dionysius, and Polybius, and once by Diodorous.

Fa'ble, originally, a story of any kind; thus Dryden's "Fables," 1700, consist merely of tales from Homer, Ovid, Boccaccio, and Chaucer; later it came to mean beast fables, and

sometimes short moral tales similar in style to beast fables, which were short stories, in which the lower animals appear (usually by themselves, but sometimes in connection with men) associating with each other as reasonable beings endowed with the virtues and vices of humanity. Such stories are found in all ages, and among races of all degrees of civilization. Their rationale is to be sought in the animistic philosophy of savage man, who makes no essential distinction between his own faculties and those which he ascribes to other living creatures—not "lower" animals to him. See ALLEGORY; PARABLE.

Fabliaux (făb-lē-ō'), certain short stories in verse composed by French *trouvères* in the twelfth, thirteenth, and fourteenth century. The *fableaux* purport to be stories from real life, and are to be distinguished from legends, romances, and didactic poems. Their sole aim was to amuse, and they are consequently usually comic and often gross. Many of them, however, are masterpieces of narrative.

Fabre (făbr), **François Xavier Pascal,** 1766–1837; French painter; b. Montpellier; wrought at Rome and Florence; best works, "The Judgment of Paris," "The Preaching of John the Baptist," and "Execution of the Children of Zedekiah by Order of Nebuchadnezzar," which won him the academical prize, entitling him to study in Rome. He left to the city of Montpellier his collection of works of art, and the local museum, which is large and important, is named after him the Musée Fabre.

Fabre, Jean, 1727–97; French Protestant; surnamed "the honest criminal," after a play of which he is the hero, and which procured his release, and finally his full pardon, after six years' imprisonment as a voluntary substitute for his father, who had been arrested while celebrating with his son and other coreligionists the New Year's day of 1756.

Fabre, Marie Joseph Victorin, 1785–1831; French author; b. Jaujac; wrote a "Eulogy of Corneille," prose, 1808, which was crowned by the French Institute; "Death of Henry IV," a poem, and "Literary History of France in the Eighteenth Century."

Fabre d'Eglantine (făbr dă-glōn-tēn'), **Philippe François Nazaire,** 1755–94; French revolutionist; adopted his surname from a wild rose (eglantine) of gold awarded to him at the floral games of Toulouse; was a secretary of Danton; one of the most violent members of the Convention; guillotined on a charge of venality. One of his best comedies, "Les Précepteurs," was first performed, 1799, with great success.

Fabret'ti, Raffaello, 1618–1700; Italian antiquary; made important discoveries in the catacombs of Rome, and during thirteen years' residence in Spain explored nearly all the antiquities of that kingdom. His first archæological works, written in Latin on "The Old Aqueducts of Rome" and "The Column of Trajan," excited a general interest.

Fabriano (fä-brē-ä'nō), **Gentile da.** See GENTILE DA FABRIANO.

Fabrice (fä-brēs'), **Georg Friedrich Alfred von,** 1818–91; Saxon soldier and statesman; b. Quesnoy-sur-Deule, France; entered the Saxon service, 1834; became a member of the staff, 1850; chief of staff to the troops in Schleswig-Holstein, 1863 and 1864, and to the Crown Prince of Saxony in 1866, during the Bohemian campaign, where he distinguished himself. He became Minister of War, 1866, assuming the great task of reorganizing the Saxon army after the Prussian pattern; commander in chief of the Army of Occupation in France, 1871; again Minister of War, 1871; Prime Minister and Minister of Foreign Affairs, 1876; created count, 1884.

Fabricius (fă-brĭsh'ĭ-ŭs), **Caius Fabricius Luscinus,** Roman statesman, celebrated for his virtue and integrity. While consul, 282 B.C., he defeated the Lucanians, Bruttians, and Samnites, and enriched the public treasury with more than 400 talents, remaining poor himself. In 280 he was sent on an embassy to Pyrrhus, King of Epirus, and withstood all his bribes, as well as the threatening aspect of an elephant seemingly let loose upon him. In 279 and 278 he commanded as consul against Pyrrhus, whom he informed that his physician had offered to poison him, whereupon Pyrrhus in gratitude released the Roman prisoners without ransom.

Fabricius (fă-brĭt'sē-ŏs), **Johann Albert,** 1668–1736; German bibliographer; b. Leipzig; Prof. of Rhetoric and Moral Philosophy at Hamburg; chief works, "Latin Library," "Greek Library," "Ancient Bibliography," "Ecclesiastical Library," and "Library of the Middle and Later Ages," all in Latin. To theologians he is best known by his collections of the apocryphal and pseudepigraphical litterature and his "Lux Evangelii" (Light of the Gospel).

Fab'rics, Tex'tile. See TEXTILE FABRICS.

Fabrizio (fä-brēt'sē-ō), **Girolamo,** 1537–1619; Italian anatomist; b. Aquapendente; professor at Padua for fifty years; was the first to demonstrate, 1574, the presence of valvular folds in the veins; and wrote surgical, anatomical, and physiological works; William Harvey was his pupil.

Fabro'ni, or Fabbro'ni, Angelo, 1732–1803; Italian biographer and scholar; b. Marradi; published "Lives of Italians Eminent for Learning who Flourished in the Seventeenth and Eighteenth Centuries," twenty volumes, 1778–1805; prior of the Church of San Lorenzo, Florence, 1767; is sometimes called the "Plutarch of modern Italy."

Façade (fă-sād'), one of the sides of a building viewed from without, especially the principal front. When applied to the other faces of a building it is used with some qualifying term, as lateral façade, court façade, etc.

Facciolati (fät-chō-lä'tē), or **Facciola'to, Giacomo,** 1682–1769; philologist; b. Torreglia, Italy; was Prof. of Logic in the Univ. of Pa-

dua, 1722; published an edition of the *Lexicon Septem Linguarum* of Ambrogio Calepino, an Augustine friar of Calepio, of the Greek lexicon of Schrevelius, and of the Lexicon *Ciceronianum* of Nizolius, Padua, 1734. He began a Latin lexicon, finished by Forcellini.

Face, front part of the human head, extending from the line of the hair on the forehead to the chin, and including the forehead, eyes, nose, cheeks, mouth, and chin, as distinguished from the posterior part of the head, which is the brain case, or cranium. The face is composed of a solid bony foundation or skeleton, upon which lie numerous muscles, blood vessels, nerves, and other structures, interspersed with a varying amount of fat, all of which are covered by the skin. The bones of the face are fourteen in number, of which twelve (*viz.*, the nasal, superior maxillary or upper jaw, lachrymal, malar or cheek, palate, and inferior turbinate bones) are in pairs, while two (the vomer and inferior maxillary or lower jaw bones) are single bones. Of the fourteen different bones technically regarded as included within the face, but seven (the nasal, superior maxillary and malar bones, and the inferior maxillary bone) go to form the facial surface; in addition to these, the frontal bone, although classed with the cranial group, contributes that part of the osseous basis of the face which supports the forehead. Of all these bones only one, that of the lower jaw, is movable, this being attached by ligaments in articulation with the temporal bones, at each side of the cranium. The four large openings which appear in the skeleton of the face (the orbits or eye sockets, nasal orifice, and interdental cleft or mouth) are partially or wholly closed by the soft parts occupying or surrounding them, which are respectively the eyes and their appendages, the nasal cartilages, and the lips. See PHYSIOGNOMY.

Fa'cet, one of the plane surfaces cut on precious stones to increase their luster; the planes which bound a crystal, the flat surfaces of the cornea of an insect's eye, or any other minute plane surface.

Facetiæ (fā-sē'shĭ-ē), collection of humorous sayings, witty stories, *bons mots*, repartees, in prose and verse. From the ancients nothing has come down except the "Jests of Hierocles," the sayings and doings of one "Scholasticus," the typical blunderer of earlier times, the prototype of the modern perpetrator of "bulls." The earliest specimen in modern times is the "Liber Facetiarum" of Poggio Bracciolini (first edited Rome, 1470).

Fac'tor, general agent employed in the purchase or sale of merchandise, with power to retain possession of the property as to which his authority is exercised, and to control its management and disposal in his own name. By the possession of these peculiar powers a factor is distinguished from a broker, who only conducts negotiations and bargains concerning property of his principal, without having it in his charge, and who properly acts in his principal's name. The term "factor," though the one usually employed in law, is not so common in popular usage as "commission merchant" or "consignee." Compensation by the principal is generally a certain percentage on the amount of purchases or sales, called factorage or commission. A domestic factor is one who resides in the same country with his principal; a foreign factor, one who resides in a different country. A foreign factor, in his relations with third persons, is regarded, to a large extent, as if he were himself principal, and he is therefore under a greater responsibility than a domestic factor. In the application of this distinction the states in the U. S. are not regarded as foreign to one another.

Factor of Safe'ty, number which expresses the ratio of the breaking strength of a bar or structure to the actual stress upon it, taking that stress as 1. For buildings and structures subject to quiet loads the factor of safety is taken at about 15 for brick and stone, 8 for timber, 6 for cast iron, and 4 and 5 for wrought iron and steel. For bridges, and for machinery subject to shocks, much higher values are used. Factors of safety are subject to variation, both on account of the different qualities and grades of materials, and on account of the varying judgment of designers. The factor of safety has been called a "factor of ignorance," and it is so if it be blindly assumed without knowledge of the elastic and resisting properties of materials. The tendency among engineers is to avoid using the term, and to establish the proper working stresses for materials from the knowledge of their properties. See STRENGTH OF MATERIALS.

Fac'tory, establishment where several workmen are collected for the purpose of obtaining greater and cheaper conveniences of labor than they could have in their homes, for producing results by their combined efforts which they could not accomplish separately, and for preventing the loss occasioned by carrying articles from place to place during the several processes necessary to the finished product. The factory system has displaced the domestic or hand system of labor. It is applied to almost every branch of mechanical production, and its application is constantly being extended. The birth of the factory system is easily assigned to the decade 1760–70, for it was during this period that the régime of machinery began. The spinning frame, the spinning jenny, and later the mule spinning machine were the inventions which brought in the factory system; but the system would not have grown at once to great proportions by the sole influence of these inventions. The extension of canals, the various improvements in the steam engine, the suppression of the slave trade (diverting a great volume of capital to new lines of investment), the war between Great Britain and her colonies in America, the political economy of Adam Smith, all these were forces which, combined, resulted in supplanting the domestic or hand-labor system of Great Britain by the factory system of labor.

In the U. S. the domestic system of labor prevailed when the war of independence closed, for the influence of inventive genius had not

yet affected labor. On the opening of the ports of the new nation the market was fully supplied by British products. This caused a new fever of patriotism, which resulted in efforts to transplant the inventions which were revolutionizing labor and production in Great Britain. The associations formed in the colonies to induce the people to purchase domestic products only, were a great assistance to the pioneers in manufactures. Their influence was supplemented by the Continental Congress in its nonimportation resolutions, under which the colonists could look only to their own resources for the supply of many commodities. The foundation of manufactures in N. America was thus permanently laid, and many household industries were established and became profitable. The desire of the whole people to shake off industrially, as they had politically, the yoke of the mother country stimulated the first Congress to pay immediate attention to the promotion of manufactures, its second act, passed July 4, 1789, being an act for laying a duty on goods, wares, and merchandise imported into the U. S.

While the factory system was established in the U. S. about fifteen years later than in Great Britain, its extension has been more rapid, and more industries have come under its operation in the former than in the latter. The states of Massachusetts and Rhode Island together led in introducing power spinning machines in the U. S. Massachusetts justly claims the first experiments in which the principles of Arkwright's inventions were embodied, and the building the first cotton factory in America; while the honor of having erected the first factory for the use of perfected machinery comprehending the English inventions may belong to Rhode Island, where Samuel Slater, called the "father of American manufactures," built a cotton factory in 1790. Certainly from the date of the erection of his factory the progress in the production of goods under the factory system has been continuous. Francis C. Lowell was the first in the world, so far as known, to perfect a factory in which all the manipulations and processes necessary to carry raw material to finished goods were carried out consecutively under one directing mind. This was done at Waltham, Mass., in 1813.

The factory system is a vast automaton, created slowly and by experimental stages; its advantages are generously conceded; and the evils it has developed have been made the subject of remedial legislation. The "Factory Acts" of Great Britain are models of correction, protection, and uplift, that, in their essentials, have been adopted in other countries. In the U. S. the legislatures of most of the states have enacted broad and stringent laws for factory betterments and instituted official inspections to insure their observance. In no direction has this state care been more effectively exercised than in the legislation concerning the employment of women and children in factories. See CHILD LABOR; SWEATING SYSTEM.

Faculæ (făk'ū-lē). See SUN.

Fac'ulty, collective designation of the instructing body of an institution of learning. It is a term of mediæval origin, and at first designated all the graduates, or those who had received power or authority (*facultas*) to impart instruction. There were said to be four faculties, those of philosophy, medicine, law, and divinity. Even now the whole body of graduates is occasionally so called, but usually the term is restricted to the body of officers of instruction and discipline in a college or university.

Faed (fād), **John,** 1820–1902; Scottish artist; b. Burley Mill, Kirkcudbright; painted "Shakespeare and His Friends," "The Cotter's Saturday Night," "Haddon Hall of Old," "Parting of Gabriel and Evangeline," and other pieces of kindred character, clothing historical fact with sentiment.

Faed, Thomas, 1826–1900; Scottish genre painter; b. Burley Mill; pupil of his brother, John Faed; Royal Academician, 1864. His work is weak in technic, but popular in Great Britain. "Shakespeare and His Contemporaries" is in the Corcoran Gallery at Washington.

Faenza (fä-ĕn'zä), city of Italy; province of Emilia; 19 m. SW. of Ravenna; has manufactures of linen, silk, paper, and glazed earthenware; this last received its technical name (*faïence*) from this city. The city has a cathedral and many palaces and remarkable old buildings. Pop. (1901) 40,370.

Faero (fā'rō) **Is'lands.** See FARÖE ISLANDS.

Fag'ging, a custom which is part of the public-school system of England. It was defined by Dr. Arnold as "the power given by the supreme authorities of the school to the sixth form, to be exercised by them over the lower boys, for the sake of securing a regular government among the boys themselves, and avoiding the evils of anarchy; in other words, of the lawless tyranny of brute force." The origin of this custom cannot be ascertained with certainty. Until well into the nineteenth century "fagging" included a number of menial functions, such as cleaning boots and candlesticks, or a boy might be fagged, for instance, during a whole afternoon at cricket, day after day. At Eton there is no cricket fagging. Football fagging is also very light at all the schools except Rugby, only some half dozen fags being told off to keep the ball in bounds. "Study fagging" still exists at Rugby, where each sixth-form boy has two fags, who sweep out his study and put it in order in alternate weeks. "Night fagging" is also still in force. The "rota" (roll of turns) of night fags is kept by the head fag, who tells off four for each week in the term. Their duties are to be ready in the passages between 8.30 and 9.30 to answer the call of any of the sixth-form boys. At Eton the fifth form have the power of fagging, but it is usually confined to the sixth form. At Harrow only the fifth-form boys are exempt from fagging.

Fagrskinna (fägr-skĭn'nä), Icelandic "Fairskin," famous parchment manuscript contain-

ing a compendious account of the Norwegian kings from Hálfdan Svarti to Sverri; compiled about the beginning of the thirteenth century in Norway from Icelandic sources. The MS. was called Fagrskinna by Torfæus on account of its handsome binding. It belonged to the Copenhagen Univ. Library, and was destroyed in the fire of 1728. At the same time another parchment of the same compendium perished, with the exception of a small fragment. Paper copies of both MSS. have been preserved, however, and from these the work was edited by Munch and Unger.

Fa'gus. See BEECH.

Fahlcrantz (fäl'krănts), **Christian Erik,** 1790–1866; Swedish poet and theologian; b. Dalarna; became Prof. of Dogmatic Theology at Upsala, 1835; Bishop of Vesteras, 1849. His most important literary works are "Noah's Ark," rated as the best long humorous poem in Swedish, and an epic on the Scandinavian apostle Ansgarius. He also published essays, sermons, and occasional and controversial writings.

Fahrenheit (fä'rĕn-hīt), **Gabriel Daniel,** 1686–1736; German physicist; b. Dantzic, Prussia; became a constructor of scientific instruments; resided in France, England, and afterwards in Holland; in 1720 he introduced the use of mercury in thermometers; invented the Fahrenheit scale (see THERMOMETER); also an improved areometer and other valued instruments.

Faidherbe (fā-dărb'), **Louis Léon César,** 1818–89; French military officer; b. Lille; served in the colonies, principally in Algeria; Governor of Senegal; in 1870–71, commanded the Armée du Nord, fought the indecisive battles of the Hallue and Bapaume, and was defeated at St. Quentin. After the war he joined the party of Gambetta, and served as deputy from Lille; wrote valuable scientific papers; also a work on the geography of NW. Africa and one on Numidian inscriptions.

Faïence (fä-ē-ăńs'), French, from the Italian *Faenza,* the original place of its manufacture; glazed pottery, especially that which is painted in colors. See KERAMICS; POTTERY AND PORCELAIN.

Faillon (fä-yōń'), **Michel Étienne,** 1799–1870; French missionary priest; b. Tarascon; became a Sulpician in Paris; in 1854 went to Canada as a visitor to the Sulpician houses of that country. He published biographies of distinguished French-Canadian religionists, and undertook an extended history of the French in Canada, of which three volumes (1865–66) were completed.

Failly (fä-yē'), **Charles Achille de,** 1810–92; French military officer; b. Rozoy-sur-Serre, Aisne; after 1828 served partly in France, partly in Algeria; commanded a brigade in the Crimean War; in the war against Austria (1859), a division of the Fourth Army Corps; in 1867 he led the expedition to protect the pope against the attacks of Garibaldi; in 1870 he had command of the Fifth Army Corps, of which he was deprived on the day before the battle of Sedan for failing to go to the support of MacMahon at Wörth.

Fainéants (fā-nā-ăń'), "do nothing," name applied to several Frankish sovereigns, chiefly of the Merovingian dynasty. Thierry III of Austrasia and Burgundy, Clovis III, Childebert III, Dagobert III, Chilperic II, Thierry IV, and Childeric III, all Merovingian kings of France, were *rois fainéants,* as was also Louis V, the last of the Carlovingians. The same appellation is often applied to worthless monarchs of later times and other countries.

Faint'ing, or **Syncope** (sĭn'kō-pē), more or less complete and sudden loss of sensation and of the power of motion, unaccompanied by convulsions, but usually attended by feebleness of the circulation and respiration. Fainting is attended by anæmia (blood impoverishment) of the brain, its proximate cause; it may be caused by loss of blood, by emotional disturbance, or by heart disease. Closely akin to it, but more permanent and dangerous, are the collapse which occurs in cholera (caused by loss of the fluid constituents of the blood), and the shock which follows severe injuries. Fainting is to be treated by placing the patient on his back in a horizontal position, or with the head and chest slightly below the level of the rest of the body; by admission of fresh air for his breathing; and, in prolonged cases, by applying diffusive stimulants to the nostrils and resorting to artificial respiration. Fainting is seldom mortal, unless in severe disease. See TRANCE.

Faioum (fī-ōm'). See FAYOUM.

Fair (word kindred to the Latin *feria,* a "holiday"), name originally given to temporary markets held at stated times for many kinds of goods and wares. When population was sparse, and the means of traveling and transportation limited, it was found most convenient to expose merchandise for sale at the largest gatherings of the people. Hence, European fairs were early identified with religious festivals, and were often designated by the name of the saint in whose honor each festival was held. However, as the difficulties and dangers of intercommunication diminished, and the number of cities and villages increased, factories, shops, and warehouses became more accessible, and the inhabitants found it more convenient and economical to buy goods as they needed them, than to purchase a year's supply in advance. Thus, fairs for the sale of goods have decreased in number and attendance with the growth and improvement of each country, until only two or three of any note are held in all Europe. The most famous of these —and, it is said, the largest in the world—is held annually during July and August at Nijni-Novgorod in Russia. The amount of sales at this fair is reported to have reached 150,000,000 rubles (about $112,000,000). Among other large annual fairs held in Europe are those of Leipzig, Germany, and Beaucaire, France. In Arabia, Hindustan, and other Eastern countries such fairs are still held, and doubtless will be continued until the general

introduction of railways and other modern improvements.

In the U. S. temporary markets containing the wares of itinerant merchants are entirely unknown, although the term "fair" is often applied to collections of fancy articles sold by ladies for the benefit of religious and charitable associations. This term has, however, acquired a higher meaning, and now more frequently designates a collection of superior products exposed, not for sale, but mainly for public inspection, and for careful examination by experts as to their respective qualities. They may be divided roughly into agricultural fairs, local expositions, and international expositions or world's fairs. See EXPOSITIONS.

Fair'bairn, Sir William (Baronet), 1789–1874; Scottish civil engineer; b. Kelso; began business at Manchester, 1817, and introduced several mechanical improvements, among which were the substitution of iron for wood in the shafting of cotton mills and the use of lighter shafting where metal was already in use; he was the first in England to construct an iron ship. His experiments to test the strength of iron and the resistance of tubes or cylinders led to important results. He coöperated with Robert Stephenson in designing and constructing the great tubular bridge across the Menai Strait; was one of the founders of the British Association for the Advancement of Science, and author of many professional books and papers.

Fair'banks, Charles Warren, 1852– ; American statesman; b. near Unionville Center, Ohio; was admitted to the bar, 1874, and settled in Indianapolis, Ind.; member of the British-American Joint High Commission, and chairman of the American Commissioners, 1898; elected U. S. Senator in 1897 and 1903; Vice President of the U. S. on ticket headed by Theodore Roosevelt, 1904.

Fairbanks, Thaddeus, 1796–1886; American inventor; b. Brimfield, Mass.; removed, 1815, to St. Johnsbury, Vt.; engaged with a brother in making carriages, cast-iron plows and stove castings, and in the business of hemp dressing. The rudeness of the methods used in weighing hemp led him to invent his platform scale, which was patented, 1831. Improvements, covered by about fifty patents, were afterwards made, and the great Fairbanks Scale Company at St. Johnsbury was established.

Fair'fax, Donald McNeil, 1823–94; American naval officer; b. in Virginia; entered the navy as a midshipman, 1837; was executive officer of San Jacinto, 1861, and personally supervised the arrest of Mason and Slidell on the English mail steamer *Trent*. In command of monitor *Nantucket*, he participated in the first attack on Fort Sumter, 1863, and, commanding monitor *Montauk*, took part in all the subsequent fights with the forts and defenses of Charleston harbor; was made rear admiral, and retired, 1880.

Fairfax, Edward, abt. 1580–1635; English poet; son of Sir Thomas Fairfax; b. Denton, York; translated Torquato Tasso's "Jerusalem Delivered" into English, verse for verse, and this work is still of standard excellence. "A History of Edward the Black Prince," in verse, and a "Discourse of Witchcraft," etc., are also his works.

Fairfax, John Contee (eleventh Lord Fairfax and Baron of Cameron in the peerage of Scotland), 1830–1900; b. Vaucluse, Va.; younger son of Albert Fairfax; succeeded to the title, 1869, on the death of his brother, Charles Snowden Fairfax, tenth Lord Fairfax; in early life practiced medicine at Woodburne, Md., and later led the life of a gentleman farmer. Although he never assumed his title, it was officially recognized in Great Britain. The Fairfaxes are of the Scottish peerage, and never had a seat in the British House of Lords. The first of the title was Ferdinando, a nephew of the poet, Edward Fairfax; made a peer, 1627; d. 1648.

Fairfax, Thomas (Lord), 1611–71; English military officer; b. Denton, Yorkshire; son of Ferdinando, Lord Fairfax; at the outbreak of the Civil War, 1642, received from Parliament a commission as general of cavalry; defeated the Royalists under Col. Bellasis; commanded the right wing at Marston Moor; commander in chief of the parliamentary, or "new model," army, 1645; gained the battle of Naseby; took Leicester, Bridgewater, Bristol, and, in 1646, Oxford. As parliamentary commissioner delivered to the Scotch army £200,000 in exchange for the king; was made commander of all the forces in England and Ireland, 1649, but refused to fight the Scots, and resigned, June, 1650. In 1654 he was a member of Cromwell's first Parliament, and, 1659, took part in the defeat of Lambert; was a member of the Council of State in 1660; in May of that year he was chairman of the committee delegated to prevent the return of Charles II. He wrote "Memorials of Thomas, Lord Fairfax," besides theological, poetical, and other works.

Fair'field, port of entry in Fairfield Co., Conn., near Long Island Sound; 52 m. NE. of New York; formerly one of the capitals of the county; was the scene of the last conflict with the Pequot Indians, 1637; was burned by the British troops under Tryon, 1779; is a summer resort, and contains a stone powder house erected during the Revolutionary War, several other relics of that period, and the Pequot and Memorial libraries. Fairfield township includes the villages of Southport and Greenfield Hill. Southport is the chief business center.

Fair Ha'ven, town in Bristol Co., Mass.; on the Acushnet River; opposite New Bedford; 60 m. S. of Boston; has the Millicent Public Library, a fine townhall, and manufactures of tacks, nails, castings, etc., besides some fishing interests. The village is connected with New Bedford by two bridges. On September 7, 1788, it was attacked by the British, who were repulsed by the militia under Maj. Israel Fearing. Pop. (1905) 4,325.

Fair Ha'vens, harbor on the S. side of the island of Crete, mentioned by Luke (Acts xxvii, 8) and by no other ancient writer. St. Paul sailed out of this harbor shortly after

the middle of October, and was shipwrecked abt. November 1, 60 A.D. It appears to have been the port of Lassæa, the ruins of which were discovered in 1856.

Fair Isle, solitary isle between Orkney and Shetland; rises 408 ft. above the sea, and is accessible for ships only at one point, on the SE. In 1588 the Duke of Medina Sidonia, admiral of the Spanish Armada, was wrecked here, and most of his crew were murdered.

Fair Oaks, or **Sev'en Pines, Bat'tle of,** battle fought May 31st and June 1, 1862, at Fair Oaks, Va., about 6 m. from Richmond. The junction of the Nine Mile and Williamsburg railroads, about 1 m. SE. of Fair Oaks, is called Seven Pines (hence the alternative name of the battle). Three corps of McClellan's army, aggregating 51,543 men, were engaged with four Confederate divisions (of Johnston's army), aggregating about 39,000. The numbers in the front or fighting lines were about 20,000 on each side. On the first day the Federal line was driven back to a position between Seven Pines and Savage's station; on the second, the Confederates were driven back, and the line from Fair Oaks to Seven Pines was reoccupied. The total Federal loss in killed, wounded, and missing was 5,031; Confederate loss, 6,134.

Fair'weather, Mount, summit rising 15,292 ft. in the St. Elias range on the W. coast of Alaska, 20 m. ENE. of Cape Fairweather. It is covered with perpetual snow.

Fair'y, term used very loosely, being often applied not only to such diminutive, sylphlike creatures, tricky but not malevolent, as Shakespeare has drawn in "A Midsummer Night's Dream," but to the dwarfs, elves, and kobolds of German popular tales, many of whom are earthy and malicious, to the *fées* of Celtic (and French) romance, who are beings of human stature and more than mortal power and beauty, and to the genies or *djinns* of Arabian story. Any kind of supernatural being not accounted for in the creeds of Christendom, and not exalted enough to be regarded as a heathen god, has been included under this general term —apparitions of the dead excepted. The term "fairy tales" is often used in English as an equivalent for the German *Märchen*, and is thus not infrequently applied to stories in which fairies play no part. See BROWNIE; ELF.

Fair'y Rings, imperfectly circular or annular patches in grass land in which the vegetation is either richer or more scanty than that around it. They are common in the British Islands and other parts of Europe, where, according to folklore, they are caused by the dancing of fairies. They began to attract the attention of scientists in the latter part of the eighteenth century. At first they were considered to be the effect of lightning. After much investigation, however, and not a little debate, it has been shown that they are caused by the growth of mushrooms, which spread from the center outward, and at first check, but afterwards by their decay accelerate, the growth of the grass.

Faith, Ar'ticles of, points of doctrine which together make up religious belief. The various churches of Christendom, not being agreed upon all these points, have for the most part set forth their own expositions of belief; and it is to these creeds, symbols, or confessions that the term is most commonly applied. The Articles of the English Church, which are not, strictly speaking, articles of faith, or a creed, but Articles of Religion, though formerly forty-two in number, are now reduced to thirty-nine. In the Episcopal Church in the U. S., Article XXI, "Of the Authority of General Councils," is omitted. In the standard American prayer book of 1892 the Articles appear with a separate title-page, indicating that they are not to be regarded as a part of the prayer book. The Methodist Episcopal Church in the U. S. has reduced these articles in its "Book of Discipline" to twenty-five. See CREED; FAITH, CONFESSIONS OF; THIRTY-NINE ARTICLES.

Faith, Confes'sions of, official statements of doctrine; "symbols," in the theological sense. As distinguished from creeds, confessions of faith are fuller presentations. We speak of the Apostles' Creed, the Westminster Confession, the Augsburg Confession. The term has also been applied to the carefully prepared statement of the faith of individuals. Articles of faith are the separate parts of confessions. A confession is an organic body or *corpus* of faith, its parts are members or *articuli*, such as the articles concerning God, sin, Christ, the Church. See CREED; FAITH, ARTICLES OF.

Faith Cure. See CHRISTIAN SCIENCE; PSYCHOTHERAPY.

Faith, Rule of, that to which faith appeals as its source and guide. Why do I believe this or that? and what am I bound to believe? are questions answered by the rule of faith, while the confession of faith, as such, simply states what I do believe. In the Roman Catholic Church the rule of faith is the body of revealed truth embraced in Holy Scripture and tradition in the sense in which the Church holds that truth. In the Protestant churches the canonical Scriptures are regarded as the sole rule of faith.

Fajardo (fä-här'dō), port on the E. coast of Porto Rico, about 1 m. from the fine bay which gives it importance. Muscovado sugar making is the chief industry of the district, and sugar, molasses, and tortoise shell are the chief exports. The town is connected with the interior by excellent roads.

Fa'kir, one of a class of religious beggars in India, found there in large numbers, and with evidence of their existence very early in Hindoo history. Some of them are ascetics, who practice surprising mortifications and bodily tortures. By these means they acquire a reputation for sanctity which gives them a great hold on the superstitions and fears of their countrymen, though there is little religious sense displayed in all these performances, which are adopted, for the most part, as a mode of obtaining notoriety or a livelihood.

Falaise (fä-lāz'), town of France; department of Calvados; 22 m. SSE. of Caen; on a

lofty platform bordering on a rocky precipice (*falaise*), which position made it a very strong fortress in olden times. Its castle, now in ruins, was the seat of the Dukes of Normandy and the birthplace of William the Conqueror. There are manufactures of cottons, hosiery, and bobbinet, and dye and tan works.

Falashas (fä-lä'shäs), the name signifies wanderers or exiles; strange people in Abyssinia inhabiting the mountainous regions of Samen and the plains along Lake Tzana, and numbering abt. 100,000. They are the remnant of natives who were converts to Judaism. Like the native Christians, they are well formed, and resemble the nomads of Arabia. Until the beginning of the nineteenth century they formed an independent tribe, governed by their own prince. They were subjected by the Amharas abt. 1800, and are now under the rule of the Princes of Tigré. The Falashas speak both the Amharic and a dialect of the Agaon tongue, and are industrious, devoting themselves to the various trades, particularly architecture; also largely to agriculture. Polygamy, though tolerated, is discouraged. Slave holding is suffered, but slave dealing is forbidden.

Falcid'ian Law, statute proposed in Rome by a tribune, Falcidius, abt. 40 B.C., by which it was enacted that testators should not have power to dispose of more than three fourths of their property by will, and that the remaining one fourth should descend to the heir. This fourth was termed the "Falcidian portion." In the U. S., Louisiana, which has adopted the Civil Law, has a similar provision. In some of the other states restrictive enactments have been made as to bequests to charitable corporations or associations. For instance, in New York a testator having a husband, wife, child, or parent living can leave to such institutions only one half of his property remaining after payment of his debts.

Falcon (fâ'k'n), name applied to various species of hawks, especially to those of the genus



PEREGRINE FALCON.

Falco, which includes the most active and fearless of the birds of prey. Among its numerous and widely distributed species are the gerfalcons, the peregrine falcon or duck hawk, the merlin, and hobby. The gerfalcons are the most N. of the diurnal birds of prey, inhabiting Greenland, Iceland, and the N. parts of Europe, Asia, and America. The peregrine falcon, found in nearly all parts of the globe, was, from its dash and courage, particularly dear to the falconer. "Noble falcons" and "ignoble falcons" are terms of falconry. See FALCONIDÆ.



HEAD AND FOOT OF PEREGRINE FALCON.

Falconer (fâk'nĕr), **William,** 1732–69; Scottish poet; b. Edinburgh; became a sailor, and is best known by his poem, "The Shipwreck" (1762). He published also various minor poems and a "Marine Dictionary."

Falconet (fäl-kō-nā'), **Étienne Maurice,** 1716–91; French sculptor; early gained distinction by a statute of Milo of Crotona; best work, the immense bronze equestrian statue of Peter the Great, executed at St. Petersburg by order of Catherine II, 1776–78.

Falcon'idæ, a family of *Raptores*, containing all the *Accipitres*, or diurnal birds of prey, except the secretary bird and the vultures of the New World. The members of the family are characterized by the presence of a bony septum between the nostrils, legs of moderate length, strongly hooked bill, sharp, curved claws, and, save the vultures, a well-feathered head. The family is divided into the following subfamilies: *Vulturinæ*, the Old World vultures; *Aquilinæ*, the eagles; *Pandioninæ*, the fishhawks; *Circinæ*, the harriers; *Milvinæ*, the kites; *Polyborinæ*, the carrion hawks; *Accipitrinæ*, the hawks; and *Falconinæ*, the true falcons.

Falconry (fâ'kŭn-rē), art of training falcons or other birds of prey for the chase, the sport itself being called in English hawking, French *le vol*. A falconry is also the place where such birds are kept. The practice is very ancient in Europe and Asia, and was in existence in the fourth and fifth centuries; and it was common in England from the eighth century to the time of the Stuarts. The sinecure office of grand falconer is hereditary in the family of the Duke of St. Albans. Hawking had a very extensive vocabulary of technical terms. In France falconry was most practiced in the time of Francis I (1515–47). He and succeeding kings had a grand falconer and an expensive hawking establishment, which the Revolution swept away. The sport existed in Germany till the end of the eighteenth century. In Italy falconry was a favorite pastime. The Persians are skillful in training falcons to hunt all kinds of birds, and even gazelles.

Faleme (fä-lä'mä), river of Senegambia, W. Africa; one of the most important tributaries of the Senegal, which it joins in latitude 14° 40′ N., longitude 11° 48′ W.

Falerii (fă-lē'rĭ-ī), powerful city of ancient Etruria; situated N. of Mount Soracte and W. of the Tiber; is believed to have been one of the twelve cities of the Etruscan confederation; was often at war with Rome; conquered and destroyed by that power, 241 B.C.

Faler'nian Wine, most celebrated of the wines of the ancient Romans; produced in the Falernian district in Campania. From all accounts, the Falernian must have resembled modern sherry.

Falguière (fäl-gyăr'), **Jean Alexandre Joseph,** 1831–1900; French sculptor and figure painter; b. Toulouse; studio in Paris. His work in both branches of the fine arts is strong, and possesses qualities of the highest order. In sculpture, "Diana," "Christian Martyr," and "Victor in the Cock Fight" (the last two in the Luxembourg Gallery, Paris), are among his best works. In painting, "The Wrestlers," "Susanna," "Slaughter of a Bull," and "Fan and Poignard" (Luxembourg Gallery), are celebrated.

Faliero (fă-lĭ-ā'rō), or **Falie'ri, Marino,** 1274–1355; doge of Venice; b. of an eminent family; served the republic in war and on embassies, and in 1354, when seventy-nine years old, was chosen to the dogate, soon after which the Venetian fleet was lost in battle with the Genoese. Not long afterwards his wife was grossly insulted by a young nobleman, and in revenge Faliero determined to destroy the whole body of nobles, who were detested by the people, and become sole ruler. His conspiracy was detected and suppressed, and the doge, after a full confession, was beheaded.

Fal'kirk, city of Stirling, Scotland; 25 m. WNW. of Edinburgh; near the old Roman wall of Antonius and the well-known Carron Iron Works; contains, among other institutions, a science and art school, free library, and cottage hospital. Its three annual "trysts" at one time were the largest cattle fairs in Scotland. Here, in 1298, Sir William Wallace was defeated by Edward I, and in 1746 the Highlanders, under Prince Charles Edward, defeated the royal troops. Pop. (1901), 29,271.

Falk'land, Lucius Cary (Viscount), 1610–43; English politician and litterateur; son of Sir Henry Cary; b. probably at Burford, Oxford; was made by King Charles gentleman of the royal bedchamber; in 1640, was member of the Short Parliament, and reëlected to the Long Parliament; 1642, became Secretary of State. When civil war broke out (August, 1642) he joined the king's army, fought at the battle of Edgehill, and was killed at the first battle of Newbury. He wrote poems and various treatises, of which is best known the "Discourses of the Infallibility of the Church of Rome."

Falkland Is'lands, archipelago in the S. Atlantic Ocean; 300 m. E. of the Straits of Magellan; area, about 6,500 sq. m., 3,000 in E. Falkland and 2,300 in W. Falkland, besides which two there are over 100 small islands and rocks. Nearly all the islands are high, and in the interior of the two larger ones there are several peaks rising over 2,000 ft. Sheep farming is the principal and almost the only industry. The Falklands, with S. Georgia, form a crown colony of Great Britain. The colonists are nearly all of Scotch birth or descent. The French under De Bougainville formed the first settlement in 1763; in 1765 Byron seized the islands for England. France transferred her rights to the Spanish, who drove the English out, and the islands remained nominally under the jurisdiction of the viceroys of Buenos Ayres, and later of the Argentine Confederation. The present colony was formed in 1851, but Argentina has never given up her claim to the archipelago. Chief town and capital, Stanley or Port Stanley, in E. Falkland.

Falk Laws, or May Laws, The, measures introduced into the Prussian Diet by the Minister of Worship and Education, Dr. P. L. A. Falk. These laws, passed in 1872, 1873, 1875, required the inspector of primary schools to be a layman; forbade members of the Roman Catholic religious orders to teach in them; enabled the government to deal with refractory bishops; restrained the power of the bishops over the inferior clergy, and the power of the clergy over the laity; made civil marriage obligatory; forbade the religious orders within the boundaries of the Prussian kingdom to receive new members; transferred the control of church property to boards of trustees composed of laymen; and required the whole clergy, inclusive of bishops, to sign a declaration of obedience to the laws of the state before entering upon office. The rigor of these laws was relaxed in 1879, and again in 1887.

Falköping (fäl'chö-pĭng), town in Westergöthland, Sweden; 38 m. SW. of Mariestad; best known by the battle of 1389, in which the Danish Queen Margrethe conquered the army of the Swedish King Albrecht, and took him prisoner. This victory led to the Union of Kalmar, 1397, by which Sweden, Norway, and Denmark were united under one crown.

Fal'lacy, in logic, a wrong notion resulting from an incorrect performance of the process of reasoning. Not every wrong notion is a fallacy. If the process of reasoning is performed correctly, and the wrong notion rises from distorted or wrongly related premises, it is an error; if from insufficient or defective premises, it is a mistake.

Fallet (fă-lā'), **Nicolas,** 1753–1801; French author; b. Langres, Haute-Marne; removed to Paris, where he became a contributor to the *Gazette de France*, the *Journal de Paris*, and the *Dictionnaire Universel*. Chief among his works are the tragedies, "Barnevelt" and "Tibère"; the comic opera, "Matthieu"; "Les Fausses Nouvelles," a comedy; and two collections of poems.

Fallières (fă-lyăr'), **Clement Armand,** 1841– ; French statesman; b. Mezin. He was mayor of Nerac, 1870–73, and then began his political career as republican deputy for Nerac, 1876–77. He served as Under Secretary of the Interior, 1880–82; was temporarily Prime Minister in 1883, and then successively Minister of

Public Instruction, 1883–85; of the Interior, 1887; of Justice, and then again of Public Instruction till 1890, when he was elected to the senate, of which he became president when Loubet was elected President of the Republic. He remained president of the senate until 1906, when he was elected eighth President of the Republic.

Fall'ing Bod'ies, Laws of. See ATWOOD'S MACHINE. GRAVITY.

Falling Sick'ness. See EPILEPSY.

Falling Stars. See METEORS.

Fallmerayer (fäl'mĕ-rī-ĕr), **Jakob Philip,** 1790–1861; German author; b. Tschötsch, Tyrol. His contributions to the history of the East during the Middle Ages are of great value; they include "History of the Empire of Trebizond" and "History of the Peninsula of Morea [the Peloponnesus] in the Middle Ages." He was the first who asserted that the modern Greeks are properly a branch of the Slavonic family of races, and that in spite of their language they have but little of the blood of the ancient Greeks.

Fall of Man, in theology, the lapse of the first man, and through him the lapse of the race, from the state of integrity into that of corruption. The myths and legends of paganism have many parallels with the account of the Fall in Genesis. In interpreting this latter, the tree of knowledge is generally regarded as affording the means of testing man as to obedience, not as having in its fruit anything specially objectionable. The serpent is simply instrumental, the mask of the real tempter, the devil. The sin of the Fall is apostasy from moral fellowship with God; is caused by abuse of the freedom of the will, and followed by loss of the divine image and by liability to temporal and eternal death on the part of Adam and his posterity.

Fallop'pio, or Fallop'ius, Gabriello, abt. 1523–62; Italian anatomist; b. Modena; Prof. at Ferrara, Pisa, and Padua. His famous "Observationes Anatomicæ" (1561) has been often reprinted. From him are named one of the canals of the ear and the two ducts leading from the ovaries to the womb. With Vesalius and Eustachius (the latter his rival) Falloppio has the honor of being the chief restorer of anatomical science.

Fal'low, or Na'ked Fallow, land which is allowed to rest after cropping for one or more seasons with no tillage, except perhaps one or more plowings. The custom is a very ancient one, and is chiefly useful on heavy soils, where it acts probably by way of liberating plant food from previously unavailable compounds. It has, among the best farmers, given way to the so-called green fallow, of which the clover fallow is one of the best kinds. Some green crop, as clover or buckwheat, is grown and allowed to rot on the surface, or is plowed under; this chokes the weeds and fertilizes the land. The growing crop saves the soil from blowing away and from baking.

Fallow Deer, species of deer (*Dama vulgaris*); the most common deer of Europe, found also in N. Africa. In a wild state it exists in S. Europe, but, as remains found in the later Tertiary show, its range originally extended farther N. In summer it is beautifully mottled. The doe is without horns. The venison of this species is regarded as the most savory known. It is smaller than the stag or red deer, and has more spreading horns. It goes in herds, and each herd has its master, an old buck, which all the others obey. The bucks at various ages have different names—"fawn," "sorrel," etc.



FALLOW DEER.

Fall Riv'er, port of entry and important railway and manufacturing center, in Bristol Co., Mass.; on the E. side of Mount Hope Bay, the NE. arm of Narragansett Bay, and along Taunton River, 20 m. from Providence, R. I. It has a safe and commodious harbor at the head of deep-water navigation. The industries include immense granite quarries, calico print works, a bleachery, spool and bobbin factory, foundries, cotton mills operating nearly 3,000,000 spindles and employing a capital of $25,000,000, making this the most important cotton-manufacturing center in the U. S. The city has a public library, normal school, high school occupying an entire square, textile school, conservatory of music, Roman Catholic college, large orphanages and hospitals, and a system of waterworks, completed at cost of $1,500,000, bringing water from Watuppa Lake, on the E. of the city. Fall River was settled, 1659, became a town, 1803, and was incorporated as a city, 1854. Pop. (1905) 105,697.

Falls. See CATARACTS.

False Bay, inlet on the E. side of the mountainous district of the S. end of Africa which terminates in the Cape of Good Hope. As it is sheltered from the NW. monsoon, it receives periodically all trading vessels from Cape Town for temporary protection, and it is the permanent station of the naval force of Cape Colony.

False Decre'tals. See DECRETALS, FALSE.

False Impris'onment, in law, any intentional and unlawful restraint of a person. It may be: (1) the restraint or arrest of a person under color of law, by an illegal or insufficient process; (2) such restraint or arrest by a legal instrument, but at an illegal time; (3) without color or pretense of law. The remedies are: (1) an action for trespass *vi et armis*, in which punitive damages are recoverable; (2) the writ of *habeas corpus* for immediate relief from restraint; (3) indictment at common law.

False Preten'ses, in law, the intentional misrepresentation of facts to secure a personal advantage. Anyone who acquires property by means of false pretenses has no legal title to it, and it may be recovered by the party from whom it was thus obtained, who is still the legal owner. The statutes of England and of the states in the U. S. make the obtaining of property by false pretenses an indictable offense. The expressions in the statutes are various; but in general, anyone who by means of false pretenses, and with a fraudulent design, obtains possession of money or goods, or obtains the signature of another to a writing for the transfer of property or the payment of money, becomes liable under the statute. The false pretenses which expose one to this punishment must relate to existing facts, and be such as would be likely to deceive a person of ordinary discretion.

Famil'iar Spir'its, demons supposed to be in attendance on fortune tellers, necromancers, and the like. The original Hebrew word rendered in the English version of the Bible "familiar spirits" in some passages denotes the persons who "have" or employ familiar spirits; in others, it denotes the spirits themselves. Nothing is said in the Bible to justify the inference that such spirits actually attended on fortune tellers and necromancers. The witch of Endor (I Sam. xxviii) was generally supposed to have a familiar spirit, but the coming of Samuel in answer to her incantations appears to have been more than the witch herself was expecting.

Fam'ilists, or **Fam'ily of Love,** English mystical sect, founded in Holland by Henry Nicholas, a native of Westphalia, and originally an Anabaptist, who removed to England near the middle of the sixteenth century. They taught that religion consists wholly in love; that God regards only the heart; and that to the pure all things are pure, even things forbidden. Queen Elizabeth dispersed them, but they flourished for another century. They were known to have been guilty of grossly immoral practices.

Fam'ily, etymologically the servants or slaves of a household; extended to designate the group of persons—including wife, children, and servants—who in Roman law were under the *patria potestas*. The word acquired biological, ethnological, and legal meanings that are often confused. The traditional belief, formulated by Aristotle in the "Politics," that the patriarchal family was the primitive social group, which grew, by multiplication of descendants, into the tribe and the state, has been challenged by modern anthropologists. Bachofen, Morgan, McLennan, Post, etc., find many evidences, including a descent of names and property in the female line, that mankind lived originally in unorganized hordes or bands, within which definite family relationships were slowly evolved. The patriarchal theory has been defended by Sir H. S. Maine, and Starcke and Westermarck hold that a definite paternal family has always existed in human communities.

Family, in zoölogical classification is a group of individuals more comprehensive than a genus and less so than an order, a family usually containing a number of genera, while an order contains so many families. Family names usually terminate an -idæ (after Latin patronymics, such as Æacidæ, sons or descendants of Æacus). In botany it is sometimes used as a synonym of order.

Fam'ine, extreme dearth of food, resulting in death by starvation and disease to large numbers of people; caused by the failure of crops, by the ravages of war, by backward methods of agriculture, insufficient harvest, lack of facilities for conveying food from one part of a country to another, etc. The U. S. has never known a famine, in the proper sense of the word. Droughts, long-protracted terms of cold weather, plant diseases, grasshoppers, mice, etc., have now and then caused dearths, but generally within narrow limits.

In China and India, where the population is dense, and millions eat no meat, or subsist on only one kind of cereals, famines are frequent. In 1877, in a famine in three of the N. provinces of China, 70,000,000 people suffered, and during the years that followed, between 4,000,000 and 6,000,000 perished. In 1906–7 a famine in N. Kiang-Sa Province, caused by destruction of the rice crops by floods, affected 10,000,000 people. In Behar, Bengal, India, 1873, through the partial failure of the rice crop, 15,000,000 were affected. In the Deccan, 1876, a famine caused by insufficient rainfall threatened 8,000,000. The famine in Persia, 1870–73, extended over the whole country, and more than 1,500,000 persons died. In the interior of Asia Minor, the same year, thousands starved to death and 2,500,000 oxen and horses perished. Japan has escaped famines only by prohibiting the exportation of rice in time of threatened famine. The European country which has suffered most from famine in modern times is Russia. There was a severe general famine in 1833, and famines occurred in the various provinces in 1840, 1844–46, 1867–68, 1872, 1880, 1891–92, and 1906–7; that of 1891–92, due to failure of rye crops, was the most disastrous.

Famine Fe'ver. See RELAPSING FEVER.

Fan, implement to produce coolness by agitating the air. Its origin is traced to remote antiquity. On the walls of the tombs at Thebes, the king is represented surrounded by his fan bearers. The fashion spread from Per-

sia to Asia Minor, and there were fans in Greece, 500 B.C. In Rome fans were common, and at dinner parties slaves with fans stood behind the guests. Ovid, Terence, and Propertius allude to their use. In the Middle Ages fans of eagle or peacock feathers, fastened with a handle of gold, silver, or ivory, were a lucrative article of trade in the Levantine or Oriental markets, whence they were exported to Italy. Catherine de' Medici introduced folding fans into France. In England, fans were in fashion in the time of Henry VIII. A superb fan set with diamonds was presented to Queen Elizabeth. Among the articles received by Cortes from Montezuma were five fans of variegated feathers. In Spain at an early day fans were common. Next to China and Japan, France is most celebrated for the manufacture of fans, but beautiful fans are also made in the U. S., in England, at Brussels, Geneva, and Vienna.

Fanar'iots. See PHANARIOTS.

Fandan'go, national dance of Spain and Spanish America, usually in 3-4 or 6-8 time. It is thought by some to have been introduced by African slaves into the colonies, and thence carried to Spain. It is very popular, and is danced generally to the guitar and the castanets.

Faneuil (făn'ĕl) **Hall,** building in Dock Square, Boston, Mass.; built in 1742 by Peter Faneuil (1700-43), a merchant of the city, and given to the town. It was burned in 1761, its walls of brick remaining. It was rebuilt in 1763, at the expense of the town. It is called the "Cradle of Liberty," from the fact that the "Sons of Liberty" held many meetings there during the early years of the final struggle of the colonies with the mother country. The British troops, during the occupation of the city, used it as a theater. In 1805 it was made 40 ft. wider and one story higher. The hall, which is used for public meetings, is about 80 ft. square, and contains several good paintings, including "Webster Replying to Hayne."

Fan'ning, David, abt. 1756-1825; American Tory leader; b. Wake Co., N. C.; became the leader of a band of Tories or loyalists, chiefly of Chatham and Randolph counties. In 1781 he took the town of Pittsboro, and soon after Hillsboro, then the state capital, carrying off Gov. Burke and his suite. He was one of the three persons excluded by act of the North Carolina Legislature from the amnesty proclaimed after the peace; escaped into Florida, traded with the Indians, made his way to New Brunswick, and thence to Digby, Nova Scotia, where he died. He wrote a curious "Autobiography."

Fanning Islands, archipelago of the N. Pacific Ocean, forming the E. part of the central Polynesian group; between 150° and 180° W. longitude; area, 260 sq. m. The most important are Christmas and Fanning islands. Formerly they were guano producing, and as the trade was carried on chiefly by Americans they were for some time known as the American Islands. Christmas, Starbuck, Fanning, and Malden islands (pop. 420) have been British possessions since 1888.

Fano (fä'nō), seaport of central Italy; province of the Marches; on the Adriatic, 30 m. NW. of Ancona; contains a cathedral with paintings by Domenichino and Guido, and the remains of a triumphal arch of white marble erected in honor of Augustus. There is a large trade in corn, oil, and silk goods. Pop. (1901) 21,000.

Fan Palm. See PALMETTO.

Fans, otherwise called fanwe, panwe, and osheba, cannibal race found on the Gaboon river and to the NE. over an extensive area in equatorial Africa. They are coffee colored, have rather thin lips, and are slight of frame. They are cannibals for ceremonial purposes, use poisoned arrows and the crossbow, and are fast becoming the dominant people of that region, where they first appeared abt. 1842.

Fan'shawe, Sir Richard, 1608-64; English diplomatist; b. Ware, Hertford; minister resident at the court of Spain under King Charles I of England; was a Royalist, and at the battle of Worcester, 1651, was taken prisoner and kept captive for years. He was privy councilor of Ireland, 1661; the same year ambassador to Portugal, and negotiator of the marriage between Charles II and the Princess Catherine; in 1664 ambassador to Spain. He translated Guarino's "Pastor Fido," "The Lusiad" of Camoens, etc.

Fanta'sia, in music, a species of composition nearly identical with the cappriccio, in which writers express their thoughts with the highest freedom compatible with observance of the fundamental laws of harmony. Originally, the fantasia was probably nothing more than simple improvisation; but the transition was easy to the writing, at leisure, of compositions resembling improvisations in peculiarities of movement, form, modulation, expression, and harmony. The term "fantasia," however, is now often given to compositions which are nearly regular in form and harmony.

Fanti (făn'tē), tribe, and the country it inhabits in W. Africa; on the Gold Coast. The country consists of a small strip of land extending along the Atlantic from Accra on the E. to Cape Coast Castle on the W., and separated on the N. from the Ashanti country by a belt of impenetrable forests. The inhabitants belong to the same family and speak nearly the same language as the Ashantis, though they are inferior to them in both skill and vigor. They started an individual civilization; built large cities; and began trading and manufacturing; but early in the nineteenth century they came in contact with the British; their labor became subservient to English enterprise and speculation; their civilization faded away, and they became a prey for the Ashantis, who in their turn were conquered by the Britis.

Fantin-Latour (făn'-tăn'-lă-tôr'), **Henri,** 1836-1904; French portrait and genre painter; b. Grenoble; his portraits are notable for their

air of truth, and quiet, reserved style. His "Homage to Delacroix" and "The Toast," portrait groups, are celebrated.

Fantoccini (fän-tō-chē'nē). See MARIONETTES.

Fan Vault'ing, vaulting peculiar to the English Gothic of the fifteenth century; so named from the fanlike radiation of groups of ribs from the caps of the vaulting shafts. Each group forms a kind of inverted semicone with curved sides; the bases of these semicones, meeting at points along the ridge of the vault, inclose between them horizontal lozenge-shaped panels. Cusps and foils adorn the panels left between the ribs. Among the finest examples are the chapels of King's College, Cambridge; St. George at Windsor; and Henry VII at Westminster Abbey.

Far'ad (from Michael Faraday, the electrician, in recognition of his classical researches in static electricity); practical unit of electrostatic capacity. It is the capacity of a condenser such that the introduction of a charge of one coulomb of electricity will produce a difference of potential of one volt between the coatings. A farad is one-thousandth-millionth of the absolute unit of capacity (c. g. s. system). A microfarad, a lesser unit, the size of which renders it of much more general application than the farad, is one millionth of the latter. The capacity of the ordinary condenser is a microfarad or a simple multiple of it.

Far'aday, Michael, 1791–1867; English scientist; b. Stoke-Newington; in 1813 became assistant to Sir Humphry Davy at the Royal Institution; in 1825 director; succeeded Davy as Prof. of Chemistry, 1827; announced abt. 1826 the discovery of benzol, which afterwards became the basis of anilin dyes; made his great discovery of magneto-electrical induction in 1831; proved the "identity of electricities," 1833; established the doctrine of "definite electro-chemical decomposition"; established the specific inductive capacity of insulators; discovered "the magnetization of light," 1845; and diamagnetism, 1846. To these discoveries succeeded his investigations on the magnetism of gases, his elaborate papers on atmospheric magnetism, 1851, his speculations on the nature of matter and force, and his researches on "lines of magnetic force, their definite character, and their distribution within a magnet and through space."

Faradiza'tion, in medicine, the application to the animal frame of induced currents of electricity. The name faradic electricity is applied (1) to the alternating current from any small "magneto-generator" in which currents are induced by the movement of coils of wire in a magnetic field; (2) to the secondary currents of a small induction coil. The primary circuit coil is usually fed from a few cells of primary or storage battery, and variations in the character and strength of the induced currents are obtained either by changing the speed of the interrupter by using various secondary coils, different windings, or by adjustment of the iron core of the coil. The term faradic battery is applied to both of the above types of apparatus.

Farallon (fä-räl-yōn') **Is'lands,** group of six small, lofty, and rocky islands of San Francisco Co., Cal., lying in the Pacific Ocean, 30 m. W. by S. of the Golden Gate, or entrance to San Francisco Bay. They are owned by a company, which here collects, for the San Francisco market, the eggs of the gull and the murre, a sea bird of the auk family. The islands breed great numbers of rabbits, and their coasts abound in sea lions.

Farce, peculiar kind of comedy in which the characters are without psychological truth and the plot without moral impression. The farce originated in the S. European countries from rustic festivities, in which masks and every other description of disguise were used. There are traces of it in the so-called Fabulæ Atellanæ, far back in the days of the old Roman republic, and it is met with now and then during the Dark Ages, until in the sixteenth century it enters the stage, where it led a brilliant life under the name of *commedia dell' arte,* as a kind of improvised drama. Molière introduced it among the arts. Many of his plays are simply farces. After his time it degenerated into comedy for the mob, and it showed no signs of revival until the middle of the nineteenth century. The present French farce is often indecent, but its mirthfulness is undeniable.

Farel (fä-rĕl'), **Guillaume,** 1489–1565; French reformer; b. near Gap, Dauphiné; became a professor in the college of Cardinal le Moine; embraced Protestantism and removed to Basel, but having quarreled with Erasmus, was forced to leave that city; preached for a time at Montbéliard; in 1527 became a teacher at Aigle. He labored in behalf of Protestantism throughout Berne, secured the reformation of the W. cantons and influenced the others to favor the new doctrines; settled in Geneva, but was expelled, with Calvin, for strictly enforcing ecclesiastical discipline; spent the remainder of his life at Gorze, Strassburg, and Neufchâtel.

Faria y Sousa (fä-rē-ä ē sō'zä), **Manuel de,** 1590–1649; Portuguese historian and poet; b. Pombeiro or Souto; envoy to Rome, 1530–34; spent the rest of his life at Madrid; wrote four volumes of verse, "Fount of Aganippe," "History of the Kingdom of Portugal," and histories of Portuguese, Europe, Asia, and Africa.

Fari'as, Valentin Gomez. See GOMEZ FARIAS.

Faribault (fä-rĕ-bō') **Plan,** scheme of public education adopted in Faribault, Minn., 1891; a compromise between the common-school system of the U. S., and the parochial system of the Roman Catholic Church; involved the surrender of the parochial-school property to the city board of education, the employment by the board of Sisters of the Church as teachers, and the exclusion of religious teaching and emblems during school hours. Though approved by Archbishop Ireland, it was bitterly opposed, and in 1893 was abandoned.

Farini (fä-rē'nē), **Carlo Luigi,** 1812–66; Italian statesman, historian, and orator; b. Russi, in the states of the Church; chosen to Parliament from Faenza; exiled for political offenses, 1843–46 and 1848–49; became Minister of the Interior in Piedmont, 1850; Dictator of Modena, 1859. In the last cabinet of Cavour he was Minister of Commerce, 1861, and President of the Council, 1862–63. Author of "History of the Roman State from 1815 to 1850"; "History of Italy," "Letters to Mr. Gladstone," "Letters to Lord John Russell," etc.

Far'jeon, Benjamin Leopold, 1833–1903; English novelist; b. London; spent some years in Australia and New Zealand, engaged in journalism. Among his numerous novels, which deal mainly with low life and have been compared to Dickens's, are "Grif," "London's Heart," "Bread and Cheese and Kisses," "Toilers of Babylon," "The Betrayal of John Fordham," and "Pride of Race."

Far'mers' Alli'ance, political organization of the U. S., originating in an "alliance" formed in Texas to oppose the wholesale purchase of public lands by private individuals. About ten years later, 1887, the Farmers' Union of Louisiana united with the Texas Alliance under the name of the Farmers' Alliance and Coöperative Union. Later in the same year the Agricultural Wheel amalgamated with the Alliance, forming the Farmers' and Laborers' Union of N. America. In 1889 the National Farmers' Alliance of Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, and Dakota, and the Farmers' Mutual Benefit Association of Illinois, joined the organization, which then took the name of the Farmers' Alliance and Industrial Union.

The object of this organization was to procure legislation in the interests of farmers and laborers. In 1890, together with the Knights of Labor, it formed the new People's Party, and, 1891, with the Knights of Labor, and other similar organizations, formed a new political party called the People's Party of the United States of America.

Farmers' Clubs. See PATRONS OF HUSBANDRY.

Farmers-gen'eral, association of persons in France, under the old monarchy, to whom the privilege of levying certain taxes, as imposts on salt or tobacco, or town dues in particular districts, was "farmed," or let out for a given sum paid down. This system of raising the public revenue was employed by the Roman state. (See PUBLICANS.) It was introduced into France in the thirteenth century. In 1720 the farmers of the taxes formed a regular association, called the *ferme générale,* with exclusive management of the *gabelle* (salt tax), the tobacco tax, the *octrois* (town dues) of Paris, and other excise duties. By the constitution of 1791 the system was swept away, and many of the farmers-general were afterwards executed.

Farmers' In'stitutes, series of meetings held in many of the U. S. under the auspices, directly or indirectly, of the government of the particular state, usually in the winter, in which agricultural operations and matters pertaining to the farmer's life are discussed. The central organization usually is vested in a state agricultural society, or the agricultural college, and official lecturers are sent to the meeting to coöperate with local speakers. Many states appropriate funds, directly or through the official agricultural organization, to maintain such institutes.

Farm'ing. See AGRICULTURE.

Farne (färn) **Is'lands.** See FERN ISLANDS.

Farnese (fär-nēz'—Italian pron. fär-nā'sā), the name of a noble Italian family, many of whose members have played conspicuous rôles in the history of Europe. For the greater part the family owed its prominent position and immense wealth to the circumstance that one of its members, ALEXANDER FARNESE, became pope (Paul III, 1534–49) and misused the influence and revenue of his position for the advancement of his family. He made his son Pierluigi, 1493–1547, Duke of Parma and Piacenza, and he provided in an equally lavish manner for his four grandsons. The most celebrated member of the family was ALEXANDER FARNESE, 1546–92, Prince of Parma and Governor of the Low Countries. He was educated at Alcala and Madrid, fought with great distinction in the battles of Lepanto and Gembloux, and succeeded his uncle, Don Juan of Austria, as governor of the Low Countries. He took Antwerp, 1585, and compelled the raising of the siege of Paris. He was also one of the greatest generals and diplomatists of the age. He created a party in the Low Countries in favor of the union with Spain; was put in command of the Armada, but being shut up in Antwerp by the Dutch flotilla was powerless; relieved the siege of Rouen, 1592, but was mortally wounded. In 1731 the male line of the house became extinct by the death of Antonio Farnese.

The Farnese Palace is one of the finest buildings in Rome; begun in 1530 by Pope Paul III (Alexander Farnese). Its architects were Sangallo, Michelangelo, and Della Porta, and its stone was taken from the theater of Marcullus. It was formerly rich in antique sculpture; but most of these treasures are now in the museum at Naples.

Fa'ro (from Pharaoh, because of a conventional figure of the Egyptian Pharaoh formerly on one of the cards), game at cards, used only in playing for money. It is played in different ways in different countries, but in all the player contends against a bank, represented by a professional faro banker; and the chances, though apparently only slightly in favor of the bank, are in reality quite strongly so. In the U. S. the game is illegal in many cities and in some of the states.

Farōe (fä'rō) **Is'lands,** a group of islands, of which only seventeen are inhabited, belonging to Denmark, and situated in the N. Atlantic nearly midway between the Shetlands and Iceland; area, 540 sq. m.; the principal island is Stromō, capital Thorshavn. All these islands are basaltic formations, rising conically to a

height of 3,000 ft., with steep and lofty coasts, abruptly broken by deep inlets. Of the common cereals and vegetables, only barley, turnips, and potatoes can be raised, on account of the high N. latitude. The inhabitants are of Norwegian origin. Pop. (1901) 15,230.

Farquhar (fär'kwär), **George,** 1678–1707; Irish dramatist; b. Londonderry; acted for a short time at a theater in Dublin, then retired from the stage and settled in London. "Love and a Bottle," "Twin Rivals," and "The Beau's Stratagem," comedies, were among his productions.

Far'ragut, David Glasgow, 1801–70; American naval officer; b. Campbell's Station, near Knoxville, Tenn.; son of a native of Minorca, who emigrated to N. America in 1776, and served in the Revolutionary War; the son entered as midshipman, 1810; was made prize master of a captured vessel, 1813; served on the *Independence* and *Macedonian* in the Mediterranean, 1815–17; became lieutenant, 1825, commander, 1841; was engaged in establishing the navy yard at Mare Island, Cal., 1854–58. In December, 1861, Farragut took command of the steam sloop of war *Hartford* in an expedition sent to capture New Orleans; directed a fleet which passed the forts at the mouth of the Mississippi and destroyed a Confederate fleet of fifteen vessels, silenced the Chalmette batteries below New Orleans and, April 25, 1862, obtained the surrender of the city; ran the batteries at Vicksburg, June 28th, July 15th; was commissioned rear admiral, July 16th. In March, 1863, he ran the fire of the forts at Port Hudson, and opened communication with Admiral Porter, who commanded the Upper Mississippi; on May 24th, in connection with the army, he began operations against Port Hudson, the fall of which, on July 9th, gave Admiral Porter the control of the Mississippi above New Orleans. On August 5, 1864, with a fleet of four ironclads and fourteen modern vessels, Farragut passed the forts at the entrance to Mobile Bay, giving orders during a desperate engagement from a place high up in the main rigging of the *Hartford.* In a few days the forts surrendered, and the passage of blockade runners was stopped, although the city was not taken. In 1864 the rank of vice admiral was given to Farragut, and, 1866, that of admiral. In 1867 in the flagship *Franklin* he commanded the European squadron.

Far'rar, Frederic William, 1831–1903; English clergyman and author; b. in the Fort, Bombay, India; became master of Marlborough College, 1871; rector of St. Margaret's, London, and canon of Westminster, 1876; archdeacon, 1883; Chaplain of the House of Commons, 1890, and Dean of Canterbury, 1895; was also chaplain in ordinary to Queen Victoria. He published works of fiction, "Eric," "Julian Home," "St. Winifred's," "Darkness and Dawn"; philological works, "The Origin of Language," "Chapters on Language," "Greek Syntax," and "Families of Speech"; theological works, "Seekers after God," "The Witness of History to Christ," "The Silence and Voices of God," "The Life of Christ," "The Life and Works of St. Paul," "The Early Days of Christianity," "Discourses and Notes on the New Testament," "The History of Interpretation," "Lives of the Fathers."

Far'ther In'dia, or Chin-In'dia. See INDO CHINA.

Far'thing, British coin, the fourth part of a penny; coined by the Saxons, and again by King John, 1210, but the quarter penny, cut twice across, also passed for a farthing. In Edward VI's time the coinage of silver farthings ceased. An act in 9 Henry V mentions a gold farthing. Copper farthings were first struck, 1665; tin farthings appeared, 1684 and 1692; half farthings were coined, 1843 and 1852. A farthing is worth about half a cent.

Fasces (făs'sēz), a bundle of rods of birch or elm, sometimes having an ax (*securis*) tied up within it. Such fasces were borne by the lictors before the kings and superior magistrates of ancient Rome; the quæstors had this distinction in the provinces only. Generals who had been saluted as "imperator" had fasces crowned with laurel, a custom anciently observed with some of the other magistrates. The number of the fasces and lictors varied with the rank of the dignitary, and was different at different periods.



FASCES.

Fascines (făs-sēns'), bundles of brushwood formed into mattresses for construction of levees and petties, for breakwaters, and in marshy places for the foundation of piers of bridges. Fascines are also used in raising batteries, strengthening ramparts, and making parapets.

Fasho'da, town on the White Nile, in the country of the large Shilluk tribe, 400 m. S. of Omdurman. It was founded by the Egyptian Govt. in 1867, and for a number of years was the S. limit of its territories in the Sudan, and the base from which the Shilluk country was subjected to Egyptian rule. A fort was built at this strategic point, and Fashoda was long a prison for Egyptians condemned to perpetual exile. When Omdurman fell into the hands of the Anglo-Egyptian forces, 1898, Fashoda was held by a French force under Capt. Marchand, who had descended the Nile, and claimed Fashoda and the country S. of it as a French possession. After lengthy negotiation, France consented to evacuate Fashoda and to relinquish all claims to territory on the Upper Nile. In 1899, Great Britain conceded to France ample commercial facilities on the Upper Nile, and the extension of the French sphere of influence in the central Sudan farther N., so as to include the whole of Wadai and its vassal states, Baghirmi and Kanem, and the populous and moun-

tainous districts of Tibesti, Borku, and contiguous oases in the desert of Sahara.

Fast and Fast'ing, abstinence from food, escially as a religious observance; also the period of such abstinence. The Mohammedans fast during the whole month of Ramadan, abstaining from all food from sunrise to sunset. The law of Moses enjoined on the Hebrews an annual fast on the Day of Atonement; others were added later. Both the Eastern and Western Churches from very early times have observed as a fast the forty days of Lent. The Roman Catholic Church observes, besides all Fridays, the rogation days, the ember days, the vigils of Christmas, Pentecost, the Assumption (August 15th), and All Saints (November 1st). Both churches make a distinction between "fasting," abstinence from all food, and "abstinence," which is refraining from flesh, eggs, milk, butter, and cheese.

The effects of fasting are determined by the kind of foodstuffs that are withheld, and the degree of abstention, the state of the body and mind, the species of animal, the length of time the fast continues, the supply of water, and attendant conditions. The human organism absolutely demands for its healthy maintenance certain kinds of foodstuffs, whereas others which enter largely into everyday diet and are of nutritive value are of incidental importance. Albuminous substances are necessary to supply nitrogen, and were these entirely withheld starvation would inevitably ensue, even though an abundance of other food be taken. On the other hand, starchy and saccharine matters and fats might be rejected without causing physical want, because they can be replaced by other materials. The earliest symptoms in enforced fasting are irritability, lassitude, a slight quickening of the pulse and respiration, and a decrease of the temperature, followed by a tendency to delirium. Wasting of the body and enfeeblement of all the vital processes continue until the loss of weight in the adult reaches about forty per cent of the original, in the young about twenty per cent, when death occurs from exhaustion, usually in about three weeks. There are cases on record in which death did not occur until forty or sixty days. When water is also withheld death occurs about one third sooner. When drinking water is not to be had great relief has been experienced and life prolonged by placing wet cloths upon the body or by immersing the feet, etc., thus allowing absorption of water through the skin.

In the restoration of diet after prolonged fasting the administration of food should be begun by giving small quantities of beef tea, milk, diluted spirits, rice broth, or similar very light diet; then gradually increasing the number of articles from day to day. In instances in which freedom of diet has been permitted, serious results have followed. The lower animals, as a rule, are less severely affected by fasting than man. During hibernation animals exist for months without food or drink, but in this condition the mind is in abeyance, vitality is exceedingly low, and, as a consequence, there is relatively little consumption of the tissues.

Fasti (făs'tī), in Roman antiquity, registers of the days, months, and other divisions of the year, corresponding to modern calendars. The *fasti calendares* or *sacri*, the chief division of these registers, contained the enumeration of all the days, divided into months and weeks of eight days according to the *nundinæ* (the days of each of the latter being designated by the first eight letters of the alphabet), the calends, nones, and ides. Days on which legal business could be transacted were marked by F, as *fasti*; those from which judicial business were excluded, and on which business contracts were invalid, by N, as *nefasti*. The rural fasti (*rustici*, distinguished from the *urbani*) also contained several directions for rustic labors to be performed each month. A different kind of fasti were those called *annales* or *historici*, also *magistrales* or *consulares*, a sort of chronicle, containing the names of the chief magistrates for each year, and short accounts of remarkable events noted opposite the days on which they occurred.

Fast'net Rock Light, light at the entrance to Long Island Bay, on the SW. coast of Ireland; the first light sighted on the Irish coast by vessels crossing the Atlantic from New York to Liverpool. The light is 148 ft. above sea level and is visible for 18 m. The arrival of many east-bound steamships across the Atlantic is first reported from Fastnet.

Fat, in the common sense, the unctuous parts of animal and vegetable bodies secreted in the cellular tissues and separable therefrom by fusion at a moderate temperature. The animal fats do not differ chemically from those of vegetable origin. Both are compounds of certain fatty acids, chiefly oleic, stearic, and palmitic acids, with a basic substance called glycerin. The fats are, as a rule, nearly insoluble in water, but dissolve readily in ether, less readily in naphtha, benzine, and the oils from coal; in oil of turpentine and other essential oils. They are scarcely at all soluble in cold ordinary alcohol.

The fats stain paper permanently and are not volatile by heat, a high degree of heat being required to make them boil. They distill over at a high heat, but not without complete, or nearly complete, decomposition, and the evolution of a substance of a pungent, disagreeable odor, irritating the eyes, and known as *acrolein*. Those fats which are fluid at ordinary temperatures are called oils. All fats burn with a bright flame and with little smoke.

Chemically fats belong to the class of compounds known as ethereal salts, or compound ethers. Most fats are mixtures of olein, stearin, and palmitin, the hard fats being chiefly stearin and palmitin, and the soft fats olein. The hard fats are beef fat, mutton fat, human fat, wax, spermaceti, etc.; the soft fats, hog's lard, butter, etc., which are greasy at ordinary temperatures; while the liquid fats, or oils, are fluid at ordinary temperatures. When a fat is boiled with a caustic alkali, or treated with lead oxide, or superheated steam, it is decomposed, yielding glycerin as one of the products, and a mixture of acids or salts

of acid. When the decomposition is effected by an alkali, the products are glycerin and a soap.

Fata Morgana (fä'tă môr-gä'nă), or castles of the fairy Morgana, a mirage occasionally seen from eminences on the Calabrian shore, looking W. on the Strait of Messina. Objects on the Sicilian shore opposite are refracted and reflected on the water in mid-channel, presenting enlarged and duplicated images.

Fa'talism, the belief in inevitable destiny. This belief has various forms. The Chaldaic or astrological fatalism looked upon the visible heavens as the book of this destiny, and found all things necessarily prefigured in the positions of the stars. The Stoical fatalism considered the rise and the decay of the world as controlled by an absolute necessity, but while this necessity, with them, was a fate which determines, it was also a providence which governs all things. The fatalism of the Greek dramatists made all events fixed under the control of Dike and Nemesis, Justice and Retribution. Mohammedan fatalism regards all things, great and small, as so inexorably predetermined from the foundation of the world that no accident is possible, and any attempted defense against danger is futile. Pantheistic fatalism considers the infinite substance which it calls God to be developed in space and time by a procedure which is so changeless that things extended or things thought are equally necessary; and which not only destroys all freedom of the will, but obliterates all distinction between good and evil. The modern philosophical conception of fate is that of a blind causality undirected and undetermined by any conditions.

Fates, The, in Greek mythology, three goddesses who ruled the fates of men and all things. They are Clotho, who spins the thread of life; Lachesis, who marks off the allotted span; and Atropos—the inflexible—who cuts the thread. They are generally associated with the Erinyes who inflict the punishment for evil deeds, and are sometimes called their sisters.

Fa'ther-lasher, or **Luck'y Proach,** marine fish of the European coasts, from 6 in. long up to a much larger size; belongs to the



THE FATHER-LASHER.

sculpin family, its head is covered with spines, and it has a repulsive aspect. It can live a long time out of water.

Fathers of the Church. See CHURCH, FATHERS OF THE.

Fath'om, originally, the length which a man can measure by extending both his arms. It now denotes a measure equal to 2 yd., or 6 ft., and is chiefly employed as the unit in taking soundings at sea, and in measuring cables, etc. The early colonists of the present U. S. reckoned the Indian wampum chains, then current as money, in fathoms.

Fatigue' of Mate'rials. See STRENGTH OF MATERIALS.

Fat'imites, family of Arabian caliphs who claimed descent from Fatima, the daughter of Mohammed, and who claimed that Ali, the husband of Fatima, was the first rightful successor of the prophet. They ruled from 909 till 1171, chiefly at Cairo, and at the period of their widest sway ruled all N. Africa, with Syria and Palestine. They professed the Shiite doctrines, *i.e.*, did not receive as part of the law the Sunna, a body of traditions about Mohammed, while the subjects of the Bagdad caliphs were orthodox. After the death of the last Fatimite of this line (Adhid), the grand vizier, Saladin, assumed authority.

Fat'ty Degenera'tion, a condition in which the minute structural elements of the tissues of living organisms are gradually replaced by fat globules. In man this diseased condition has been observed in nearly all the tissues. In some tissues such degeneration seems to be nature's means of obliterating them. In the liver, it is merely an excess of the normal fatty element, which, however, encroaches upon the liver cells, and becomes a true fatty degeneration. It also attacks the muscles, and especially the heart; the bones, the brain (yellow softening), the cornea (forming a hazy ring often seen in the eyes of the aged and known as the *arcus senilis*), and the kidney in many cases of so-called Bright's disease. The fatty degeneration of the heart unaccompanied by valvular disease is difficult to detect. When suspected, a quiet life and a nourishing but not too stimulating diet, with the judicious use of tonics and iron, are to be recommended. Fatty degeneration, in which the cells themselves degenerate into fat, must be distinguished from fatty infiltration, a condition much less serious, in which fat forms between the unaltered cells.

Fatu'ity, state of mind characterized by absence or great deficiency of will and intellect, and by apathy with regard to those things which normally arouse the feelings and impulses. If congenital, it constitutes complete or partial idiocy. When it is associated with, or consequent on, acute disease, it has no significance except as a symptom; while if it be long continued, obscure in its origin, and progressive, it is almost certain to result in dementia, one of the most hopeless forms of mental disorder.

Faubourg (fō-bōr'), formerly part of a French city outside the walls, but now applied to any suburb. Thus the Faubourg St. Germain and

the Faubourg St. Antoine, parts of Paris, and respectively the typical fashionable or working quarters of the town.

Faucher (fō-shā'), **Leon,** 1803–54; French politician; b. Limoges; edited leading journals in Paris; excelled in political economy; member of the Chamber of Deputies, 1846–48, and the Constituent Assembly, 1848; Minister of the Interior for short periods, 1848–49 and 1851; promoted the restriction of suffrage, 1850. After the *coup d'état* of December 2, 1851, he devoted himself chiefly to the interests of the *credit foncier*, having previously advocated a gradual reduction of duties, and a commercial league between France, Belgium, Spain, and Switzerland, as a counterpoise to the German "Zollverein." He wrote on property in France, on prison reform, and on the social, industrial, and political institutions of England.

Fault, in geology, a displacement of a rock stratum or layer along a line of fracture. "The amount of dislocation measured in a *vertical direction* produced by a fault is termed its 'throw,' a fault being said to be an 'upthrow' or a 'downthrow,' or an 'upcast' or a 'downcast,' according to the side from which we view it" (*Jukes*). The dislocation may have been caused by the mass on one side of the fracture having subsided by reason of its weight, or the displacement may be the result of an upward thrust. Faults may be vertical or inclined at various angles. The inclination of a fault plane is called its *hade*, and the direction of a horizontal line lying in a fault plane is called its *strike*. Faults may extend indefinitely downward, and the throw may amount to many thousand feet. Horizontally also, faults extend for long distances; one in Virginia, according to H. D. Rogers, has been traced for upward of 80 m.

The fissure accompanying a fault may be wide and the interval filled up with subsequent deposits, thus in many instances giving rise to mineral veins; or the faces of the fracture may remain in apposition. In the latter case the sliding of the one surface over the other will have smoothed and polished both, thus causing the appearance known as "slickensides." One of the chief difficulties and causes of expense in coal and other mining is caused by displacement of the veins or beds by faults. Geology, by establishing the facts which determine the sequence of sedimentary strata, has done much to simplify the difficulties caused by faults in coal mines. Miners in different districts use the terms "slip," "slide," "heave," "dyke," "thing," "throw," "trouble," "check," etc., to express a fault.

Fau'nus, in Roman mythology, a woodland deity, corresponding to the Grecian Pan, and having many of the attributes of the latter. He had the power of prophecy, his oracles being in groves. A festival, named Faunalia, was celebrated in his honor by the country people. As a frolicsome wood deity, represented with the horns of a goat and the feet of a satyr, he was multiplied by the poets, and the Fauni or Fauns corresponded to the Greek satyrs. Poetic tradition represented him as an early King of Latium, son of Picus, grandson of Saturn, and father of Latinus.

Faure (fōr), **François Félix,** 1841–99; French statesman; b. Paris; became a merchant in Havre; chief of battalion in the Garde Mobile in the Franco-German War; member of Chamber of Deputies; Under Secretary for the Colonies, 1882–85 and 1888; Minister of Marine, 1894; was chosen President of the French Republic in 1895, and served till his death.

Faust (fowst), or **Fust, Johann,** d. abt. 1466; German printer; b. Mentz; was a goldsmith; probably had no share in the invention of printing, but assisted in developing the art. He advanced funds to Gutenberg, the inventor entering into partnership with him, 1450. This connection was dissolved, 1455, and Faust, taking possession of the materials in repayment of his advances, associated with himself his son-in-law, Peter Schöffer. On the sacking of Mentz, 1462, Faust's workmen were scattered, and the printing process, which had been kept a secret, was made known in other countries. Faust resumed the business, and made several journeys to Paris.

Faust, or **Faus'tus, Dr. Johann,** a prominent character of the national and popular poetry of Germany. According to tradition he was a celebrated necromancer, born abt. 1480. Having mastered all the secret sciences, and being dissatisfied at the shallowness of human knowledge, he made an agreement with the devil, according to which the latter was to serve Faust twenty-four years, and then Faust's soul was to be delivered to eternal damnation. Satan sent to him Mephistopheles as a familiar spirit. Faust now began a brilliant worldly career. When remorse tormented him, and surfeit led him to sober reflection, Mephistopheles amused him with all kinds of curious devilries. To divert him from matrimony, Satan sent to him from the lower regions the beautiful Greek Helena, by whom he had a son, Justus Faustus. As the term of twenty-four years draws to its close, he seeks relief and salvation from priests, but nothing avails him. Everyone flees from the doomed man. Midnight approaches; an unearthly noise is heard from Faust's room, and next morning they find it empty, but on the floor and walls evidence of a violent struggle; the corpse, mangled in a most horrible manner, they find on a dunghill. Faust's death is presumed to have taken place in 1538. More than 250 works on the legend are enumerated.

Fausti'na, Annia Galeria, the SENIOR, 104–41 A.D.; and Annia, the YOUNGER, 125–75; mother and daughter, who were wives respectively of the Roman emperors Antoninus Pius and Marcus Aurelius; both were notorious for profligacy, the daughter surpassing her mother in dissoluteness, yet their husbands ranked them after death among the goddesses and raised temples and altars to perpetuate their memories.

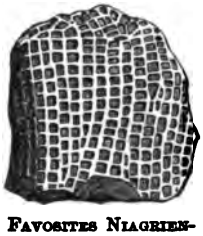
Fauvette'. See BLACKCAP.

Favart (fä-vär'), **Marie Justine Benoîte,** 1727–72; French actress; appeared as a vocalist in 1744, and in 1745 married Charles Simon Favart (1710–92), a dramatist, the inventor of vaudeville. He followed with his troupe the camp of Marshal Saxe, by whom he and his wife were severely persecuted for her rejection of his advances. After the death of Saxe (1750), she reappeared in Paris. She excelled equally as actress, singer, and dancer, and introduced many improvements in costume and other accessories. Several plays by her are printed with her husband's works.

Favo'nius, Marcus, Roman politician, whose career was marked by strong opposition to Pompey and devotion to Cato; was ædile, 55 B.C.; probably prætor in 49. In 48 he changed, going over to Pompey's party; after the battle of Pharsalia, August, 48, he was reconciled to Cæsar, but after Cæsar's murder, 45, joined the party of Brutus; was outlawed and put to death, 42 B.C.

Favori'nus, Roman philosopher and rhetorician of the second century A.D.; b. Arelate (now Arles) in Gaul, France; distinguished for his knowledge of Greek. He stood high in the favor of the Emperor Hadrian; wrote numerous works on a variety of subjects, all in Greek, and was famed also as an orator.

Favosi'tes, family of palæozoic fossil corals belong to the hydroid acalephs. They are a comprehensive type, intermediate between the polyps and the higher acalephs, and having some of the characters of both; named from their close resemblance to a honeycomb (Latin *favus,* "honeycomb").



FAVOSITES NIAGRIENSIS.

Favre (fävr), **Jules Claude Gabriel,** 1809–80; French statesman; b. Lyons; became a lawyer conspicuous in the defense of revolutionists and conspirators, including Orsini. In 1848 he was successively Chief Secretary in the Ministry of the Interior, member of the Constituent Assembly, and Under Secretary for Foreign Affairs. He was conspicuous in the Legislative Assembly, and was the most eloquent of the so-called irreconcilable opponents of the empire, 1858–70. In 1870 was Vice President of the Provisional Government of National Defence, and foreign minister, and in an interview with Bismarck, September 19th, undertook to pay any amount of indemnity, but adhered to his original declaration that "France would not cede an inch of her soil nor a stone of her fortresses." He rejected the conditions imposed by Bismarck in a later interview for an armistice pending the elections. He signed at Frankfort, May 10th, the definite treaty of peace, and retained the foreign office under Thiers till the end of July. He published "Rome and the French Republic" and "The Government of the 4th of September."

Fa'vus, or **Scald Head,** contagious disease formerly known as *tinea* and *porrigo,* generally seated on the hairy part of the scalp, but sometimes attacking the roots of the nails and other parts; frequently affects cats, rabbits, and mice, from which it may be communicated to man; it is caused by a parasitic fungus, known as *Achorion schœnleinii*; weak solutions of carbolic acid or corrosive sublimate are the best applications.

Fawkes (fâks), **Guy.** See GUNPOWDER PLOT.

Fay. See FAIRY.

Fayal (fī-äl'), one of the most important of the Azores, a group of islands in the N. Atlantic belonging to Portugal; has the best harbor in the islands and lies in the track of vessels crossing the Atlantic; area, 69 sq. m., with 24,000 inhabitants. It is very fertile, and besides its considerable transit trade with the U. S. it exports oranges and wine; principal town, Horta.

Faye (fä), **Herve Auguste Étienne Albans,** 1814–1902; French astronomer; b. St.-Benoit, Indre; studied with Arago; on November 22, 1843, discovered the comet bearing his name; became Prof. of Astronomy in the Polytechnic School at Paris, 1873; published astronomical treatises. The comet which bears his name has a periodic time of seven and a half years, and is never visible to the naked eye.

Fay'etteville, capital of Cumberland Co., N. C.; on the Cape Fear River; 60 m. SW. of Raleigh; seat of the State Colored Normal School and the Donaldson-Davidson Academy (Presbyterian); has a large trade in rosin, turpentine, cotton, horses, and mules; manufactures of flour and grist, ice, woodenware, edge tools, and cotton goods. The U. S. arsenal here was seized by the Confederates, April 22, 1861; Gen. W. T. Sherman occupied the city, March 11–14, 1865, and destroyed the arsenal.

Fayoum (fī-ōm'), or **Fayum,** province of Egypt; on the W. side of the Nile; area, 493 sq. m.; pop. (1897) 371,000; capital, Medinet-el-Fayum (pop. 33,069), 65 m. SW. of Cairo and 30 m. NW. of Benisuef. The Fayum is a basin formed by a depression in the Libyan range, its main plateau being on the level of the Nile, but in its lowest point 116 ft. below sea level. Of its area, which was anciently greater than at present, more than 100 sq. m., are occupied by the natural lake Birket-el-Kerun. It is still the most fertile province of Egypt, abounding in figs, grapes, apricots, olives, and other fruits; but its ancient renown was much greater. It contained the Labyrinth and the artificial lake Mœris, both built by Amenemka III, the great king of the twelfth dynasty—according to Wilkinson, nearly 2000 B.C.; according to Mariette, nearly 3,000 B.C.

Feast, periodically returning or occasional day set apart for rejoicing; often distinguished by the observance of religious ceremonies. There has probably never been any community which has not had its festivals, and which has not owed much to them. As their history

shows, a marked influence on the separate states of Greece was produced by their common festivals, the Olympic, Pythian, Isthmian, and Nemean games. To these all of Hellenic race were admitted, and none other, as competitors for the prizes given. The right to contend was highly esteemed. Each state sent representatives, and so did colonies, such action being about the only tie with the mother state. Whatever their dissensions among themselves, as against the rest of the world they were of one blood; they made a clear distinction between Greeks and barbarians, and their national games helped to mark this line of separation and to draw them to each other.

Among the Romans there were many festivals, private and public; the latter were *stativæ*, fixed, *conceptivæ*, movable, or *imperitivæ*, occasional; these were divided into days of sacrifice and days of banqueting, days of games and days of rest, or *feriæ*. Some of the feasts were celebrated with great pomp.

In Leviticus xxiii is given a list of the "feasts of the Lord"; the Sabbath, Passover, Feast of Weeks, Feast of Trumpets, Atonement, and Feast of Tabernacles. All Christian bodies who keep stated festivals agree in their general observances while differing in respect to the minor feasts. The Church of England, when the Book of Common Prayer was set forth, provided special services (with two exceptions) only for the days of saints connected directly with the life of Christ, while yet, from whatever reason, other names were retained on her calendar. The Episcopal Church in the U. S. has omitted all days for which there is no prescribed service.

Feath'er-foil, Wa'ter Feather, or Water Vi'olet, popular name of the *Hottonia inflata* of the U. S. and *H. palustris* of Europe, curious plants growing submerged in water, and thrusting long scapes into the air to bear the blossoms, which in the European species are very beautiful. The generic name commemorates Peter Hotton, a Dutch botanist who died 1709. These plants are primulaceous, *i.e.*, belong to that herbaceous order of which the primrose is the type.

Feather Grass (so called from its long feathery awns); any one of several long-awned grasses, particularly any species of the genus *Stipa*, several of which grow in the U. S. From the twisting and untwisting of these awns, as the air gets alternately dry and moist, the name "weather grass" is also used. This hygroscopic twist causes the awn to screw the seed down into soft earth, where it takes root. On the great plains of the W. U. S. some species are called porcupine grasses because the pungently pointed fruits work their way into clothing, and even through the skin. Sheep and dogs are often seriously injured by them.

Feather Riv'er, in California; formed by the union of its N., S., and Middle forks, which rise in Plumas County in the Sierra Nevadas. Its waters reach the Sacramento in Sutter County, passing through a rich gold region; length, 180 m.

Feathers, complicated modifications of the skin, forming the external covering or plumage of birds. An ordinary feather is composed of a quill or barrel, a shaft, and a vane or beard consisting of barbs and barbules. The first feathers of a bird are direct continuations of the down with which the nestling is clothed, this down being borne on the tips of the growing feathers and later broken or worn off. The second and all succeeding growths of feathers, although produced from the same papillæ (minute projections of skin) as the first, have no connection with their predecessors, the old feathers being shed and new ones grown in their places. This change of plumage, termed "molting," takes place at least once annually; some birds molt wholly, or partially, twice a year. Some, like the crow, acquire their adult plumage at the first molt; others, such as the albatross and male eider duck, require several years for the attainment of their full dress.



PARTS OF A FEATHER.

1. Quill. 2. Shaft. 3. Vane or beard. 4. Accessory plume. 5. Lower umbelicus. 6. Upper umbelicus.

The colors of feather are due to pigment (colored substance) in them, to pigment combined with a peculiar arrangement of their outer surface, or to the structure of the outer surface alone. To the first class of colors belong black, red, and brown; the second are well shown by the green or blue feathers of parrots, while the gorgeous metallic hues of humming birds are examples of the third. White is not due to pigment, but to the presence of innumerable air cells in the substance of the feather.

Febric'ula, or Ephem'eral Fe'ver, short feverish attack lasting from one day to a week, marked by a rapid pulse, a furred tongue, and often by a very considerable increase of heat and by headache. Persons suffering from febricula are said to be "threatened with a fever," and are too often improperly dosed. A warm bath, warm or cold water to drink, as best suits the patient, the use of enemata (rectal injections) if called for, and other simple treatment is sufficient, for the disease will pass away of itself if allowed to do so.

Febro'nianism (from *Febronian*, pertaining to Justinus Febronius, the pseudonym of the founder of Febronianism); views taught in the writings of J. N. von Hontheim, 1701–90, suffragan bishop of the Roman Catholic diocese of Treves. He taught that the primacy of the pope is of human origin, and opposed with vigor the Ultramontane view, *i.e.*, the view held "beyond the (Alps) mountains" or in Italy, which exalted the papacy as a divine institution. He had many followers, but in his old age was so annoyed by persecution of himself and his family that he recanted twice, and finally abandoned his bishopric; but Febroni-

anism long survived, and the Old Catholic movement of the nineteenth century was its development.

Feb'ruary, second month of the Gregorian or common civil year, containing twenty-eight days ordinarily, and twenty-nine days in leap year.

Fécamp (fā-kăn'), seaport of France, department of Seine-Inferieure; at the entrance of the Fécamp River into the English Channel; 22 m. NE. of Havre; has one of the best harbors on the channel, and is much frequented by colliers from Newcastle and Sunderland, and by timber ships and fishing vessels from the Baltic; is a favorite resort for sea bathing, and has two remarkable churches, a hydrographical school, shipyards, tanneries, cotton mills, sugar refineries, etc., and herring fisheries famous since the thirteenth century. Pop. (1900) 15,381.

Fechter (fĕsh'tĕr), **Charles Albert,** 1824–79; French actor; b. London; studied sculpture, but went on the stage in Paris at a very early age, first great success was in the French theater at Berlin, 1846, where he appeared as the original Duval in "La Dame aux Camélias" of Dumas. In 1860 he undertook characters in English on the London stage, and gained great success as *Ruy Blas, Hamlet, Othello, Iago, Macbeth, Coriolanus, Claude Melnotte,* and in "The Corsican Brothers," etc., in spite of his disregard of the traditions and conventionalities of the English stage. He first appeared in New York, January 10, 1870, and afterwards made his home in the U. S.

Feckenham (fĕk'ĕn-ăm), **John de** (original name *Howman*), abt. 1516–85; English Roman Catholic theologian; b. Feckenham Forest, Worcester; successively chaplain to the bishops of Worcester and London and to Queen Mary; became Abbot of Westminster, 1556. He endeavored to reclaim Lady Jane Grey to the Catholic faith; during the persecution of the Protestants used all his influence to secure moderation toward them; opposed the Reformation in the House of Lords; and was imprisoned from 1560 till death.

Fedelini (fā-dĕ-lē'nē). See MACARONI.

Fed'eral Hall, building formerly standing on the site now occupied by the U. S. Subtreasury, at the NE. corner of Wall and Nassau streets, New York City. It was built as a townhall in 1699, and was demolished, 1836, to make room for the subtreasury. Here the first Congress convened, and here Washington was first inaugurated.

Fed'eralist, a term in politics which in general is applied to an advocate and supporter of a close union of states under a common government as against those who would weaken or destroy such a union. More specifically the term has been applied to a remarkable series of papers written in the early history of the U. S. Govt. for the purpose of securing the adoption of the Federal Constitution, and to the political party which, immediately after the adoption of the Constitution, advocated a strong central government instead of a weak one.

With the exception of the concluding nine of the eighty-six numbers, the collection of essays termed the *Federalist* was originally published in *The Independent Journal,* a semi-weekly newspaper printed in the city of New York, between October 27, 1787, and April 2, 1788. Its authors were Alexander Hamilton, James Madison, and John Jay, who addressed themselves over the common signature of "Publius," in a series of letters, "To the People of the State of New York," with the avowed purpose of securing the accession of that State to the Constitution as proposed by the Federal convention of September 17, 1787. The immediate cause, or, so to say, provocation of the work, was the appearance, almost simultaneously with the recommendation of the convention, of two series of able articles so severely criticising the proposed Constitution that its adoption was more than endangered. Hamilton resolved to counteract these attacks through the same means, the public press.

As a political party in the U. S., the Federalists claimed to be the friends of the Constitution and of the Federal Government; formed in 1788, in opposition to the Republican Party; most distinguished leaders, Washington, Adams, Hamilton, Jay, and Marshall. They were defeated in every national election after 1796. Their opposition to the War of 1812, and above all the calling of the Hartford Convention, led to their final defeat, 1816, and the disbandment of the party before the election of 1820.

Federa'tion, union of states under a compact by which the general or common government is supreme in its own sphere. As distinguished from a confederation, with which it is often confounded, a federation is a composite sovereignty under a supreme government formed from attributes of sovereignty relinquished by the constituent states or component parts of the new body politic. It follows, as to domestic policy, that a federal government within its proper sphere can act directly on the individual citizens of the several states, instead of mediately through the state governments; as to international relations, it follows, further, that the supreme central power alone can hold intercourse with foreign governments, which recognize only independent sovereignties. Contrariwise, the several states forming a confederation retain their autonomy and sovereignty, and can maintain all international relations not conflicting with the conditions of the union, while the individual subject is answerable only to his own state government.

Fee, in law, a term, whose derivation and original meaning are not certainly known, now used to signify the kind of estate or tenure by which land is held. The word fee alone means an estate without qualification or limitation, and a fee simple is the highest estate held of any superior or by any tenure, an estate in fee and a fee simple being the same thing. A fee simple is an absolute estate of inheritance, descendible to heirs general, and may be acquired by descent or by purchase, every

mode of acquiring land except descent being in law denominated purchase. The essential words in any instrument by which a man should take land in fee are to the grantee or devisee and "his heirs." The ancient severity of the rule requiring these words of inheritance is now relaxed in England and the U. S.

Fees less than fee simple are fees in any way restrained or diminished, and include those technically known as qualified, determinable, and conditional fees, and fees tail. Fee tail is a lesser estate of inheritance carved out of a fee simple, and exists where a conveyance or devise is made to a person named and the heirs of his body or some specified class of the heirs of his body, instead of to his heirs general. Formerly the understanding was that the grantee of an estate tail had and could convey only a life interest, but means were devised whereby he might convey a fee.

In the U. S., estates tail have had no practical existence since the Revolution. In a general sense the term "fee" also means any reward or compensation for services; but mainly, in law, either the remuneration fixed by law for the services of public officers, or the reward received or due for professional services, as by a lawyer or physician. In Scotland the term is also commonly used as the equivalent of wages, especially the wages of servants. Fees are in general distinguished from salaries by being remuneration for specific services rendered by a special or general agent; salaries being wages received by persons in the general employ of another at a rate or amount agreed on per day, week, or otherwise.

Fee'ble Mind'ed. See INSANITY.

Fee'jee. See FIJI.

Feel'ing, in psychology, in its narrower meaning the sensation produced by an object on the sensory nerve, as hearing denotes the sensation produced by an object on the auditory nerve, sight the sensation produced by an object on the visual nerve, and so on. In its wider sense it comprises all the impressions received through the senses, as they all arise from the same general sensibility, which is particularized in the sensory organs; but it refers to them not as far as they are sensations in the organs of sense, but as far as they are modifications of consciousness. Thus feeling is nearly synonymous with emotion, and the two expressions are often used synonymously, though emotion is more properly applied to the separate states of the feeling, and feeling to the general capacity for emotions. Emotion refers to the shifting, changing surface of the feeling—feeling, to the steadily recurring sentiments rooting in the depths of our organization. See EMOTION; SENSATION.

Fehmic (fā'mĭk), or **Vehmic Court,** a tribunal of somewhat mythical origin that flourished in Germany during the Middle Ages. These courts first appear in history after the expulsion of Henry the Lion from his estates by the Diet of Wurzburg in 1180. They were presided over by a *Freigraf,* or free count, and their tribunals were either open—held by day in the open air—or secret. The Fehmic courts were at first administered in a fair and upright manner, and enforced a respect for law and order at a time when society was in confusion, but finally came to have a most extensive and dreadful authority. In the Pact of Westphalia, 1371, they were recognized as lawful. In 1438 the Emperor Albert II attempted to suppress them. In 1461 so dreadful was their influence that many nobles, prelates, and cities of Germany and Switzerland combined to resist their power. In 1495 Maximilian I gave them a new code, which greatly reduced their authority. In 1568 their last open court was held near Celle, in Hanover, but in Westphalia, their true home, these courts nominally existed until 1811, holding secret meetings, but were suppressed in the latter year by Jerome Bonaparte.

Feigned Diseas'es, term used to cover all the manifestations coming under the head of the technical terms "malingering" in English and "simulation" in French and German. These terms apply to the pretense that one has a disease, an injury, or a defect, which is not present. Such pretending has been common from the earliest times. The most ancient case on record is in Gen. xxxi, though it may be unjust to assume that the asserted condition in that case did not exist. Another case is that of David, who, fleeing from King Saul, took refuge with Achish, King of Gath, and then made his escape from a rather hazardous situation by pretending to be insane. The motive for malingering is usually a desire to avoid unpleasant situations or to secure money or notoriety or sympathy. The pretense of insanity is a too familiar resource among criminals. Beggars on the street and pampered women alike malinger to secure their desires or to punish others through their feelings; while the nervous and other affections following accidents are frequently the basis of fraud to secure damages.

Feijó (fā-zhŏ'), **Diego Antonio,** 1784–1843; Brazilian statesman; b. São Paulo; took orders, and was a priest in Parahyba, Campinas, and Itû; was deputy of São Paulo to the Cortes at Lisbon, 1822, and was one of the five Brazilian deputies who left that body on the declaration of indepedence; was deputy, 1826–33, and a leader of the Liberals. He was Minister of Justice, July 4, 1831, to July 26, 1832, and preserved order under trying circumstances; was elected Regent of Brazil during the minority of Pedro II, 1834; retained his post until September 18, 1837, in an almost constant struggle with the Conservatives; was noted for his virtue and austere adherence to principle.

Feith (fīt), **Rhijnvis,** 1753–1824; Dutch poet; b. Zwolle; was chosen burgomaster there, 1780; works include tragedies, "Lady Jane Grey," "Inez de Castro," "Resuscitation of Lazarus"; tales, "Julia" and "Ferdinand and Constance"; a didactic poem, "The Count"; also "Odes and Poems."

Feld'spar, or **Fel'spar,** family of minerals embracing many species, which crystallize in several systems. In chemical composition they

are silicates of alumina, with silicates of other bases—either soda, potash, or lime. By some the term is restricted to one species, the common potash feldspar, or orthoclase. Popularly the term is also applied to albite, a soda feldspar, and to labradorite and oligoclase, soda-lime feldspars, etc. Feldspars enter largely into the composition of all granitic rocks (which are crystalline and granular), of many metamorphic rocks (formed of deposited sediment, later hardened and recrystallized by heat and pressure); and as the chief material, of porphyries (marbled rocks with a fine-grained feldspathic base) and volcanic rocks. In their decomposition they are the source of clay. Moonstone and lapis lazuli are members of this family valued in the arts, and feldspar is also used as a glaze for porcelain.

Felic'itas, Saint, Christian martyr; put to death, with her seven sons, at Rome under Antoninus Pius (abt. 150 A.D.). All were arraigned together before the tribunal of Publius the prefect. To the question whether they would sacrifice to idols, they replied by a refusal, confessing their Christian faith. The officer informed the emperor, and by him they were left to the sentence of the judges, who ordered the sons to be put to death by diverse punishments, but the mother to be beheaded.

Fel'idæ, family of carnivorous mammals (typical genus, *Felis*) including the cats; distinguished by having but one true molar on each side of either jaw, by thirteen dorsal vertebræ, and by digitigrade feet provided (except in the cheetah) with retractile claws. The skeleton shows special modifications for a predatory life. The wide zygomatic arches (under the eye sockets) allow room for the powerful muscles which move the jaws; the canine teeth are for piercing and tearing; the digitigrade feet (stepping on the toes) give an elastic, noiseless step; the hind legs are adapted for leaping, while the powerful fore legs have free motion for striking, grasping, or tearing. The family is the most highly specialized of the order *Carnivora,* and its members, almost without exception, live on the fresh flesh of animals which they have killed themselves.

Fe'lix, Antonius, freedman of the Emperor Claudius, whence he was also, according to Suidas, called Claudius; a brother of the powerful freedman Pallas, through whose influence with the emperor and the Empress Agrippina Felix he was appointed procurator (governor) of Judea, 52 A.D. Throughout his administration he had to contend against riots and seditions of every sort, stirred up by bandits (the so-called *sicarii*), religious zealots, and false prophets. He suppressed them with a cruelty and rapacity which defeated its own end, producing more crime and disturbance than ever. It was this Felix to whom St. Paul was sent for trial after his arrest at Jerusalem, and before whom he so "reasoned of righteousness, temperance, and judgment to come" that "Felix trembled." Nevertheless, he was detained by Felix two years; was released by his successor, Festus.

Felix, Marcus Minucius (commonly called MINUCIUS FELIX), Roman lawyer and one of the earliest Christian writers, perhaps before Tertullian, although his period is variously set between 170 and 303 A.D.; wrote the dialogue "Octavius," designed as a popular defense of Christianity, remarkable for its choice diction.

Felix of Valois (văl-wăh'), 1127–1212; saint of the Roman Catholic Church; b. Valois, France; with his disciple, John of Matha, devoted himself to redeeming captives held in bondage by the Mohammedans, for which service they founded the Order of the Trinity, known later as Trinitarians or Redemptionists.

Fel'lah, plural Fellahin (fĕl'lä-hēn), the laboring class in Egypt. The fellahin are mostly Mohammedans, but a few are Copts. Except the slaves, they are the lowest class of the population, of which they form sixty-one per cent. Politically and socially they have considerably improved under the British régime. They are of mixed Coptic, Arabian, and Nubian stock; are licentious, idle, and obstinate, owing to ages of grievous oppression.

Fellat'as, or Fu'las, Mohammedan people of the W. Sudan, Africa, remarkable for their enterprise, intelligence, and religious zeal; comprise a foreign race distinct from the negroes; have many tribes and several shades of color and varieties of form, probably due to blending with subject races. They cultivate Mohammedan learning enthusiastically. Their history is obscure. Sokoto is their principal state, but they are the predominant people of several Sudanese lands, and are found as far E. as Darfur.

Fellenberg (fĕl'lĕn-bĕrkh), **Philipp Emanuel von,** 1771–1844; Swiss educator; b. Bern; devoted his large fortune to the purchase of the estate of Hofwyln near Bern, and to the founding of model institutions in accordance with the views of Pestalozzi. In 1807 and 1808 he established the agricultural and the scientific institutions and a normal school. The establishment was open to all classes, and was enlarged until it comprised nine schools, including two for children. By these schools, and by his writings on agriculture and education, Fellenberg exerted a remarkable influence in Europe. The institutions were dissolved after his death, but others sprang up in Switzerland and Germany.

Fel'lowes, Robert, 1770–1847; English author; b. Norfolk; took holy orders, 1795, but later rejected the doctrines of the Established Church, and adopted the opinions given in his "Religion of the Universe." He had previously published "A Picture of Christian Philosophy," "Religion without Cant," "The Guide to Immortality," "A Body of Theology," etc. Baron Masères left him most of his large fortune, to be used in literary and benevolent enterprises.

Fellows, Sir Charles, 1799–1860; English archæologist; b. Nottingham; made several excursions in Asia Minor, and important discoveries of architectural and sculptured remains, which he described in two works published,

1839 and 1841, and many of which were deposited in the British Museum; also published "Coins of Ancient Lycia," etc.

Fe'lo-de-se, one who kills himself with malice aforethought. In England this crime was punished with forfeiture of goods and chattels, and the body was buried in the highway with a stake thrust through it; but the custom fell into disuse many years ago. Suicide seems never to have been made punishable as a crime by statute in the U. S.; but the State of New York has provided punishment for attempts at suicide. See HARA-KIRI; SUICIDE.

Fel'ony, according to Blackstone, "an offense which occasions a total forfeiture of lands or goods, or both, at the common law, and to which capital or other punishment may be superadded, according to the degree of guilt." Anciently in England a felon was to be punished by loss of life, of land, of goods, and by attainder. In more recent times felony meant in practice any crime punishable with death; but at common law the forfeiture incurred by the crime was the essence and test of felony. In the U. S., where the nature and punishment of crimes are generally determined by statutory provisions, there is no universal meaning given to the word "felony." Some states give to it a specific definition, designating by it crimes for which a certain kind of penalty is provided, but making the latter different from that by which the meaning of the word was originally determined. Thus in New York any offense punishable by death or by imprisonment in a state prison is a felony. In a few states the term is discarded, and if employed at all in legal proceedings it is without definiteness and precision of meaning. See CRIME; MISDEMEANOR; TORT.

Felsite (fĕl'sīt), or **Fel'stone,** flinty rock which has about the same chemical composition as granite, but which to the unaided eye appears homogeneous. The microscope shows such rocks to be composed of the same mineral ingredients as granite, but in a finely divided state. They are therefore called cryptocrystalline. Such rocks are identical with the base or ground mass of the porphyries, to which they are related, although they are free from porphyritical crystals.

Fel'spar. See FELDSPAR.

Felt, fabric composed of wool, fur, or hair, of which the fibers, being jagged in one direction, are so entangled and interlaced that they cannot readily be separated. The process of felting is like that of fulling, involving the use of heavy rollers; in it lees or size is generally used. Felt has long been known; is mentioned by Homer and Hesiod. It was a common material for caps, hosiery, floor cloths, tents, and cloaks. It is still used as such material, especially in making hats. As nonconductors of heat coarse sorts of felt are used to cover steam boilers and cylinders, etc. In the East the nomads of the desert largely occupy tents of felt. There is a tradition that St. Clement discovered felt while on a pilgrimage; having put a pad of carded wool into each shoe to save his feet from blistering, he found at his journey's end that moisture and friction had converted the wool into felt.

Feluc'ca, vessel used in the Mediterranean; has a small tonnage, light draught, and great speed under a light wind. These vessels have from ten to eighteen sweeps, or large oars, carry lateen sails, and have frequently a rudder at each end so that they may be used as "double enders" and may reverse their course without tacking or veering.

Fem'ern, or **Feh'marn,** very low, perfectly level, marshy, but fertile island in the Baltic, belonging to Prussia, and separated from Holstein by a narrow and shallow sound; has two towns, Burg and Petersdorf; was taken from Denmark in 1864.

Fe'mur. See LEG.

Fen'cing, art of attack and defense with any weapon but such as cut or break by sheer force, especially the small sword or rapier, when any other arm, as broadsword, bayonet, or stick, is used, the kind of weapon is specified. Fencing was cultivated by the ancients. The Italians were the most expert fencers of the sixteenth century. Spain and France imported the art from Italy. Fencing is pursued both as a recreation and as an exercise. While it demands no violent straining of the muscles, it greatly develops the whole physique, and imparts a delicacy of touch, with steadiness and lightness of hand.

The principle on which is based the defense of the person by means of the small sword is a peculiar application of the lever, whereby the fencer in parrying causes the point of his adversary's blade to deviate from the direct course, and throws it aside from his own body. The instrument for exercise is a foil, having a handle similar to that of the small sword, with a guard of metal or leather between the handle and the blade, and a button at the end in place of a point. The fencer depends on his sword hand for protection, rather than on his agility of leg; but he must be quick and active on his legs to be able to advance, retreat, or lunge. Thrusts are directed solely at the body; a hit on a limb can only be accidental, and in a fencing school will not be counted as a hit.

The Italian foil is 38 to 40 in. long, and is heavier and less pliant than the French foil, which is only 34 in. The pure Italian school is in vogue only in lower Italy and Sicily; the Neapolitan masters are celebrated for their adroitness in their particular method. The Venetian school resembles the Neapolitan; the Piedmontese is mixed, partaking of the old French and the Neapolitan. The Spanish school is a modification of the Neapolitan. The French established a method of their own. The instruction for the small sword is the basis for attack and defense with every other weapon; but almost every attack and parry with the broadsword is the reverse of those with the small sword. The mode of using the broadsword on horseback is a variation of its use by a combatant on foot; the horseman is obliged to protect his horse as well as him-

self. The bayonet at the end of the musket is, when employed by a line of soldiers, a very formidable weapon. The knife or dagger requires quickness of hand and eye.

Fen Coun'try, lowest lying part of England, tributary to the large and shallow bay known as the Wash, and embracing an area of 1,200 sq. m., fronting on the middle coast in the neighborhood of that bay; is called the "Holland of England," for the surface being so low and flat that much of the sea front requires protection by walls. The natural drainage agencies are the Witham, Welland, Nen, and Ouse rivers, with rather indefinite courses and changeable mouths, and meandering slowly through a region that once was neither good land nor open water. By extensive canalization and drainage much of the land has been reclaimed, and the river courses have been regulated by embankments. Fishing is an important industry along the coast.

Fen'dall, Josias, colonial Governor of Maryland, 1656–60; appointed by Parliament, 1658, his previous appointment, 1656, having been made by the proprietors; was superseded, 1660, for intrigue, and later banished; a fine of 40,000 lbs. of tobacco was imposed on him in 1681.

Fénelon (fān-lōṅ'), **Bertrand de Salignac,** (Marquis de la Mothe); d. 1589; French diplomatist; ambassador in London at the time of the Massacre of St. Bartholomew, 1572, and was charged by Charles IX to appease the resentment of Elizabeth. His numerous writings include interesting accounts of his experiences, and a curious correspondence between Catherine de' Medici and her son Charles IX, relating to Elizabeth, Mary Stuart, and the massacre.

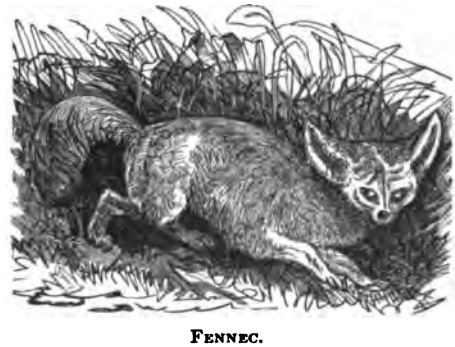
Fénelon, François de Salignac de la Mothe, 1651–1715; French prelate and author; b. Château de Fénelon, Périgord; received holy orders abt. 1675; 1678 Superior of the Order of Nouvelles Catholiques, for the instruction of converts, and 1698 preceptor to the sons of the dauphin; Archbishop of Cambrai, 1695; the friend and defender of Madame Guyon, who was denounced as a heretic by Bossuet, and who signed a renunciation of her doctrines in 1699. The same year Fénelon was banished from the French court and condemned by the pope. He wrote "Maxims of the Saints on the Inner Life" (to vindicate his own principles); the famous "Fables," "Adventures of Telemachus," "Dialogues of the Dead," "Treatise on the Education of Girls," "Demonstration of the Existence of God," etc.

Fenestel'la, Lucius, 49–21 A.D.; Roman historian; flourished under Augustus, and lived into the reign of Tiberius; wrote a work entitled "Annales," of which the twenty-second book is cited by Nonius, and which supplied to Plutarch materials for some of the statements in his "Lives."

Fe'nian, name first applied in the early history of Scotland and Ireland to a tribe of warriors noted for their prowess. Finn MacCumhail was their most famous chief. According to Irish annals he died abt. 285 A.D. So great was his renown that these Gaelic warriors were henceforth called Feinne, Fiana, or Fenians. Their deeds form the theme of many poems and legendary tales in Celtic literature, and are also commemorated by various names in Scotch and Irish topography. In early Irish histories they are represented as a militia, whose duty it was "to defend the country against foreign or domestic enemies, to support the right and succession of their kings, and to be ready, upon the shortest notice, for any surprise or emergency of state." With the rise of monasticism the order disappeared, but Finn and his Fenians, and especially his two sons, Fergus and Oisin (the Scottish Ossian), long remained to the Gaelic (Highland Scotch) imagination what Arthur and his knights were to the Cymric or Welsh.

In 1859 the name was applied to an organization of Irishmen formed in the U. S. and Great Britain to secure the independence of Ireland. The organization was constituted on republican principles, having its social, district, and state circles, and its congress, in which was vested the supreme legislative authority and the choice of the chief executive officer. The first Fenian Congress met in Chicago, 1863; the order, however, did not attract much attention until its second congress, in Cincinnati, 1865. In 1866 several attempts were made by the Fenians in the U. S. to invade the British provinces, but all, except two, were frustrated by the U. S. authorities. The two companies who succeeded in crossing the Canadian frontier were speedily driven back, and most of those who returned were taken prisoners and sent on parole to their homes. In 1867 a number of Fenian riots occurred in Great Britain, but all were soon quelled, and some of the rioters hanged. From that period the Fenian excitement rapidly subsided.

Fen'nec, small fox, distinguished by the size of its ears, inhabiting N. Africa; body about a foot long; bushy tail a little less; ears 3 in.



FENNEC.

in length; general color yellowish, except the tip of the tail, which is black; lives in burrows, and is partly nocturnal in its habits.

Fen'nel, popular name of a genus of Old World *umbelliferous* herbs, closely allied to the dill genus. The common fennel, the sweet fennel, and *F. officinale* of Europe (the first

cultivated in the U. S. also) are raised for their seeds, rich in volatile oil of fennel, a pleasant, warm, aromatic employed in pharmacy. The leaves and blanched shoots are used as salad and pot herbs in Europe. Among pop-



COMMON FENNEL.

ular superstitions there is a belief that he who sows fennel seed sows sorrow. Fennel leaves were once emblematic of grief. The giant fennel, in whose stalk Prometheus (of Greek mythology) concealed the fire which he stole from heaven, was the *Ferula ferulago* of the Mediterranean coasts, whose pith is still used as a port fire and as tinder.

Fen'ton, Edward, abt. 1550–1603; English navigator; accompanied Sir Martin Frobisher on the expedition for the discovery of a NW. passage to Asia, 1577; commanded an expedition to Brazil, 1582; and one of the ships sent against the Spanish Armada, 1588.

Fen'wick, George, d. 1657; proprietor of part of Connecticut; one of the patentees of the plantation of Saybrook, which he governed, 1639–44; then sold it to the Connecticut colony, returned to England, and became a parliamentary colonel and one of the judges at the trial of Charles I.

Fenwick, John, 1618–83; English Quaker and founder of a colony in New Jersey. His grant of land in W. Jersey was obtained, 1673, and he settled at Salem, 1675. 1678 Gov. Andros, disputing his claim to the governorship, confined him in prison two years. Fenwick transferred his claim to William Penn, and died in poverty.

Fenwick, Sir John, d. 1697; English Roman Catholic conspirator in the reign of William III; was committed to the Tower for his part in the assassination plot, June 11, 1696, and a bill of attainder against him being passed, January 11, 1697, he was executed, January 28th. This was the last execution in consequence of attainder in Great Britain.

Fe'odor, name of three Russian princes. FEODOR I, abt. 1557–98; Emperor of Russia; son of Ivan IV, the Terrible; came to the throne in 1584; was the last of the house of Rurik; was ruled by his brother-in-law Boris Godunoff, who succeeded him, having caused the murder of Feodor's brother Demetrius. FEODOR II, d. 1605; Emperor of Russia; son of Boris Godunoff; succeeded to throne in 1605; murdered after a reign of two months by the partisans of the first pseudo-Demetrius. FEODOR III, 1661–82; Emperor of Russia; son of Alexis; succeeded in 1676; was engaged in war with Poland and Turkey; curbed the power of the nobility; established (1680) the first Russian school in Moscow; excluded from the succession his imbecile brother Ivan, and bequeathed the throne to his half-brother, Peter the Great.

Feodo'sia. See KAFFA.

Feoffment (fĕf'mĕnt), mode of conveyance of landed property, formerly in use in the English law, by which land or other corporeal hereditaments (visible and tangible property) was transferred by one person called a *feoffor* to another called a *feoffee*. Feoffment meant originally, under the feudal system, the giving of a feud or fee, but in the modification of the system of land tenure which afterwards ensued the word denoted the grant of an estate in fee-simple, and was then extended to any transfer of freehold estates in hereditaments purely corporeal. An actual delivery of the land was made by a peculiar ceremony known as *livery of seizin*.

Fe'ræ Natu'ræ, legal term applied to wild animals and those not fully domesticated: as bears, foxes, deer, pigeons, wild geese, etc. The distinction of such animals as a class from the domestic class is important, on account of the difference in the right of property which an owner is held to have in the two instances. Property in domestic animals is absolute, or indefeasible; while in *feræ naturæ* it is qualified, *i. e.*, the right of property continues only as long as the animals are reclaimed from their savage or wild condition, and ceases when they return to it. When animals are of such a kind or disposition that if permitted to range freely they would never return of themselves to their owner, his ownership of them can continue only so long as he keeps them confined.

Fer de Lance (fâr dė lăns), venomous serpent (*Craspedocephalus lanceolatus*) of the



FER DE LANCE.

West Indies; so named in allusion to the peculiar markings on its head; this snake is ex-

tremely prolific; and is from 5 to 8 ft. long. It gives no warning of its attack; the bite is often fatal, and when its present effects are warded off by stimulants it usually ruins the health of the sufferer. It is dreaded by all animals, and the horse cannot by spur or whip be forced within striking distance of it.

Fer'dinand the Just, d. 1416; King of Aragon; co-regent of Castile and Leon near the close of 1406; became king, 1412, and defeated and imprisoned the Count of Urgel, 1413.

Ferdinand, name of a number of European sovereigns, the most important of whom are here treated under the alphabetical order of the countries over which they ruled:

FERDINAND I, 1793–1875; Emperor of Austria; son of Francis I, Emperor of Germany (the old empire); married Maria Anna Carolina Pia, daughter of Victor Immanuel I, King of Sardinia, 1831; took the throne March 2, 1835; was under the direction of Prince Metternich, his prime minister; abdicated in favor of Francis Joseph, December 2, 1848, after having repeatedly fled from Vienna during the revolutionary agitations of that year.

FERDINAND I, 1503–64; King of Bohemia and Hungary and German emperor ("Emperor of the Romans"); b. Alcalá, Spain; King of Bohemia, February 24, 1527, of Hungary, October 28, 1527, and "King of the Romans," January, 1531; took the title of emperor when his brother, Charles V, abdicated, September, 1556, and was recognized as emperor by the electors at Frankfort, 1558, but forbidden to take the title by Pope Paul IV. FERDINAND II, 1578–1637; King of Bohemia and Hungary and German emperor; a grandson of Ferdinand I and Duke of Styria. His cousin, the Emperor Matthias, surrendered to him the rule of Bohemia, 1617, and he succeeded him as emperor, 1619. His intolerance had shortly before kindled the Thirty Years' War. The Bohemians now offered their crown to the Elector Palatine, Frederick V, and joined forces with Bethlen Gábor of Transylvania. After the overthrow of Frederick (1620), Ferdinand abolished the charter of Bohemia, oppressed the Protestants, prosecuted the war under Tilly, Wallenstein, and others, and procured the election of his son Ferdinand as King of the Romans. FERDINAND III, 1608–57; King of Bohemia and Hungary and German emperor; son of the preceding; became King of Hungary and Bohemia, 1625 and 1627, respectively; gained the battle of Nördlingen in the contest of his father against the Swedes and their allies, September 6, 1634, and was made "King of the Romans," 1636; became emperor, 1637. The Thirty Years' War continuing, the battles of Thionville, of Fribourg, and of Sommershausen were fought, 1639, 1644, and 1648. In 1648 he signed the peace of Westphalia, guaranteeing religious liberty to his Protestant subjects.

FERDINAND, 1861– ; King of Bulgaria; youngest son of Prince Augustus of Saxe-Coburg and Princess Clémentin, daughter of King Louis Philippe; served as lieutenant in Austrian army until 1886; accepted the throne of Bulgaria, then a principality, in 1887; not recognized by the great powers until 1896; became king when Bulgaria declared her independence of Turkey, 1908.

FERDINAND V of Castile, II of Aragon, III of Naples, and II of Sicily (surnamed THE CATHOLIC), 1452–1516; son of John II of Navarre and Aragon; married, in 1469, Isabella, sister and heiress of Henry IV of Castile, on whose death (1474) Ferdinand and Isabella were proclaimed joint sovereigns. In 1479 he inherited Aragon, and thus became master of the greater part of the peninsula. His chief policy was to increase the power of the crown. In 1492 the kingdom of Granada, the last stronghold of Moorish power in Spain, yielded to his arms. A few months later an edict for the expulsion of the Jews was issued, and hundreds of thousands left the country, being subjected to terrible sufferings. In 1501 the Moors attempted to revolt, and Ferdinand ordered them to become Christians or leave the kingdom; about 3,000,000 departed then and later. In the discovery of America he had little if any share; the glory of having aided Columbus belongs to Isabella. Ferdinand's great general, Gonsalvo de Cordova, secured for him the kingdoms of Naples and Sicily. After the death of Isabella, in 1504, the regency of Castile, on account of the insanity of his daughter Juana, fell to him during the minority of her son Charles, Juana's husband, Philip I, dying in 1506. The king now gained paramount influence in Italy. He also acquired several towns and fortresses in Africa, and the kingdom of Navarre. Ferdinand was the founder of the Spanish monarchy, and, although unscrupulous in his ambition, was one of the ablest princes of his age. Cardinal Ximenes was his great minister. He was succeeded by his grandson, Charles I (V of Germany).

FERDINAND I, 1423–94; King of Naples; illegitimate son of Alfonso the Magnanimous of Aragon; legitimized by Pope Eugene IV, and crowned king, 1458. In a short time his subjects invited John of Anjou to take the throne; having done so, John sustained himself for a time, but Ferdinand defeated him at Troia, 1462, and became master of the kingdom in 1463. In 1486 the barons of Naples revolted; Ferdinand having made peace with them, treacherously arrested and massacred them at the palace. For this he was excommunicated by Innocent VIII, 1489; but made peace with the pope, 1492. FERDINAND IV of Naples, and I of the Two Sicilies, 1751–1825; became king in 1759, on the accession of his father to the throne of Spain as Charles III. His imperious wife, Carolina Maria, daughter of Maria Theresa, and her favorite, Acton, ruled the court in the interest of the cabinets of Vienna and London, and against France. In 1799 the French occupied his capital, and Ferdinand retired to Sicily. The Parthenopean republic was established, but after a few months Ferdinand was restored, and a reign of terror was inaugurated. In 1801 he was obliged to yield to French domination; in 1805, driven from the throne of Naples, which was given by Napoleon to his brother Joseph; in 1812 he granted his Sicilian subjects a constitution; in 1815 was restored to his former throne, and in 1816 united Sicily and Naples into a single state.

His despotism provoked the revolution of 1820, which was suppressed by Austrian intervention. FERDINAND II ("KING BOMBA"), 1810–59; King of the Two Sicilies; succeeded his father, Francis I, 1830; his promises and liberal measures at first excited great hopes among the friends of liberty, which his later course cruelly disappointed. The history of his reign is a catalogue of conspiracies, rebellions, executions. His reckless bombardment of Messina, September 2–7, 1848, won him his shameful surname.

FERDINAND I, 1345–83; King of Portugal; b. Coimbra; son of Peter the Cruel and Constance of Castile; succeeded to throne in 1367; claimed Castile, 1369; engaged in war with Henry II of Castile, who invaded Portugal and forced him to sue for peace, 1371; war was renewed in 1373 and 1381. FERDINAND II, 1816–85; titular King of Portugal; b. Vienna; son of the Duke of Saxe-Coburg-Gotha; married Queen Maria II of Portugal, 1836; after her death (1853) was regent for two years during the minority of their son, Pedro V; married Eliza Hensla, an American opera singer, 1869; was offered and declined the Spanish crown, 1870. He was noted as a painter and engraver.

FERDINAND VII, 1784–1833; King of Spain; b. St. Ildefonso; proclaimed Prince of Asturias and heir to the crown, 1790; in 1802, married Maria Antoinetta Theresa of Naples, who d. May 21, 1806. On the abdication of his father (March 19, 1808) he succeeded to the kingdom, but was compelled by Napoleon to give it up, May 6, 1808, and sent with his brother and uncle to the château of Valencay. On being liberated in 1814, he returned to Spain, annulled the Spanish constitution and dissolved the Cortes. In 1823 the French having invaded Spain under the Duke of Angoulême, Ferdinand was held a prisoner by the revolutionists, but the success of the French caused his restoration, which he celebrated by an amnesty and false promises of good government. On March 29, 1830, he reëstablished the Pragmatic Sanction of 1789.

Ferghana (fĕr-gä'nä), formerly the Khanate of Khokand; since 1876 a province of Russian central Asia; area, 35,446 sq. m.; pop. (1907) 1,828,700; chief towns, Khokand (former capital), Marghilan (present capital), Namangan, and Audijan; has been called "Blooming Ferghana," being one of the richest and most promising regions in this part of Asia. The cultivable land is in the valley of the Syr-Daria, and the rest is steppe or mountain land, for the most part treeless and desolate, and in many places useless even for grazing. Wheat, rice, barley, vines, cotton, vegetables, and all the best fruits of S. Europe thrive here. American cotton has been introduced, and is one of the most profitable crops. Industries are diversified, and constantly developing; the population, mostly Mohammedans, are persevering, work their fields skillfully, build irrigation works, and develop vineyards and fruit and garden industries.

Fer'gus I, d. abt. 305 B.C.; King of Scotland; son of Fergus, King of the Irish-Scots; invited to Scotland to repel the Picts, and for this was chosen king; was drowned in passing to Ireland.

Fer'guson, Adam, 1724–1816; Scottish philosopher; b. Perth; studied theology, and as chaplain accompanied a Highland regiment to Flanders, 1745; was Prof. of Natural Philosophy in the Univ. of Edinburgh, 1759–64, and of Moral Philosophy, 1764–84; 1778, was secretary to the Peace Commission sent to the U. S. His chief works are "History of the Progress and Termination of the Roman Republic," "Essay on the History of Civil Society," "Institutes of Moral Philosophy," and "Principles of Moral and Political Science." He belongs by his general method to the school of Bacon.

Ferguson, James, 1710–76; Scottish astronomer; b. Banff; the son of a day laborer, and while tending sheep made models of machines, and taught himself drawing and the rudiments of astronomy; was afterwards enabled to study painting, medicine, and astronomy in Edinburgh. In 1743 he settled in London, where he attracted attention by a publication of astronomical tables. His most important works are "Astronomy Explained on Sir Isaac Newton's Principles," "Lectures on Mechanics," "An Easy Introduction to Astronomy," "An Introduction to Electricity," and "Art of Drawing in Perspective."

Ferguson, James, 1797–1867; Scottish-American astronomer; b. Perth; removed to New York, 1800; was assistant civil engineer on the Erie Canal, 1817–19; assistant surveyor on the Boundary Commission under the Treaty of Ghent, 1819–22; astronomical surveyor on the same commission, 1822–27; civil engineer for the State of Pennsylvania, 1827–32; first assistant of the U. S. Coast Survey, 1833–37; and assistant astronomer of the U. S. Naval Observatory, 1847–67. He discovered during this latter service the following asteroids: Euphrosyne, 1854; Virginia, 1857; Echo, 1860. For these discoveries the Academy of Sciences of France awarded to him its astronomical prize medal in 1854 and 1860.

Ferguson, Patrick, 1744–80; British military officer and inventor; b. Pitfour, Scotland; entered the army. 1759; patented the breech-loading rifle, 1776; armed a corps of loyalists with it, which helped to defeat the Americans at Brandywine, 1777; was killed while defending King's Mountain, S. C., with 800 militia against 1,300 Americans. During the battle of Brandywine he had a chance of picking off an officer, but "let him alone, disgusted with the idea of firing at the back of an unoffending individual, who was acquitting himself very coolly of his duty." Next day he learned that the officer was Washington.

Feriæ (fē'rĭ-ē), in ancient Rome, those holidays whereon business could not lawfully be done and when slaves might rest. These were numerous and of many kinds. Marcus Antoninus reduced the number to 135 a year. The way in which they were kept varied extremely; in general their observance contained

a religious element, and resembled that of the Christian Sabbath.

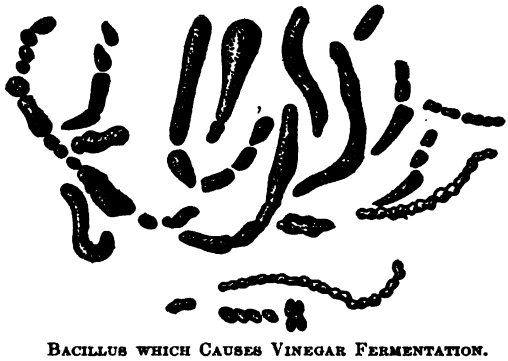
A "feria" in the Ordo of the Roman Catholic Church is a week day having no feast. The feriæ of Ash Wednesday, Holy Week, Whitsun Eve, and the Octaves of Easter and Whitsuntide have the offices of Sundays of the first class. The feriæ of Advent, of Lent, the Ember Days, and the Monday of Rogation Week are called "greater feriæ."

Fer'ishtah, or Fir'ishta, Mohammed Kasim Hindu Shah, abt. 1550–1612; Persian historian; b. Astrâbâd; wrote the "Tarîkh-i-Firishta," a history of the Mohammedan power in India, commencing about the close of the tenth century. In the introduction he gives an account of Indian history prior to the invasion of the Mussulmans.

Ferland (fĕr-lăn'), **Jean Baptiste Antoine** (l'Abbé), 1805–64; Canadian author; b. Montreal; admitted to orders in the Roman Catholic Church, 1823; was priest and professor in Canada several years, then superior of the College of Nicollet, 1847, later professor at Laval Univ. His chief works are "Observations on the History of Canada," "Notes on the Registers of Notre Dame de Quebec," "A Voyage to Labrador," "Courses of History of Canada from 1534 to 1633," "Journal of a Voyage to the Coast of Gaspé."

Fermat (fĕr-mä'), **Pierre de,** 1601–65; French mathematician; b. near Montauban. French savants claim for him a great part in the discovery of the differential calculus. He made important discoveries in the theory of numbers, and invented a theory of finding maxima and minima. Laplace thought Fermat ought to share with Pascal in the fame of the invention of the calculus of probabilities. He was a councilor of the Parliament of Toulouse, cultivated mathematics as a recreation, and is known as the first to propose two celebrated theorems called by his name.

Fermenta'tion, conversion of an organic substance into one or more new compounds, under the influence of a body called a ferment. The



Bacillus which Causes Vinegar Fermentation.

following are the kinds of fermentation usually recognized: (1) saccharine, (2) alcoholic or vinous, (3) acetic, (4) lactic, (5) butyric, (6) mucous or viscous, (7) putrefactive. When the process requires only the presence of water and the access of unfiltered air and is accompanied by liberation of fetid gases, as in the decomposition of urine, blood, or flesh, it is termed "putrefaction," and it is offensive, owing to the liberation of sulphuretted hydrogen, ammonia, and other volatile bodies. When it occurs with free access of air, and without excess of water, it is termed "decay" or *eremacausis*, as when a fallen tree molders into humus. The term "fermentation" is limited in common use to the process as conducted for the production of inoffensive and useful products, as when grape juice and malt wort are fermented into wine and beer.

The substances most liable to putrefaction are compounds rich in nitrogen, such as albumen, fibrin, casein, gluten, gelatin, etc. Bodies which appear to ferment spontaneously are composed of carbon, hydrogen, nitrogen, oxygen, and sulphur. Many nonnitrogenous substances, consisting of carbon, hydrogen, and oxygen only, which are incapable of fermenting or putrefying spontaneously, readily undergo this change when brought in contact with albuminous or gelatinous compounds, either fresh or just beginning to putrefy. These latter bodies, which are capable of exciting fermentation, are called ferments, and bodies that can be made to ferment by them are said to be fermentable. One of the most active ferments is yeast, a plant which develops in liquids undergoing vinous or alcoholic fermentation. Bodies composed wholly of carbon and hydrogen do not appear to be capable of fermenting under any circumstances. Temperature influences both the development and the character of fermentation. It cannot occur at a temperature much below 40° F., nor much above 140°.

Fern, name of highest order of cryptogamous plants, and in restricted sense the most characteristic of the division *Pteridophyta*. Ferns are leafy plants producing a stem or rhizome, which creeps below or upon the surface of the earth, and sometimes rises 50 ft. above it as a tree trunk, crowned with terminal leaves or fronds. The rhizome is a fibrous woody cylinder, growing only at the end, and so of equal diameter throughout, giving out rootlets anywhere, and showing on a cross section a hard fibrous rind composed of the angular bases of fallen fronds. This rind incloses a cellular tissue with a ring of woody plates, folded and curled, which are the bases of the leaf stalks, and in the cellular mass or lightly developed pith. The stem is in fact a consolidated bundle of leaf stalks.

The frond is circinate or coiled in vernation or in the bud, and when unfolded is often of great size (25 ft. long). The size of the fronds varies from a diameter of less than a quarter of an inch to an expansion unequaled by any other plant except some seaweeds. The fructification or seed formation of ferns is always on the lower face of the fronds, which sometimes under its influence are reduced to simple supports in the shape of a spike or panicle. It consists of *sporangia* or capsules, each containing many spores, and

usually attached to the veins, but sometimes covering the whole surface. These capsules are grouped in clusters of various forms called *sori*,



TREE FERNS.

1. Alsophila excelsa. 2. Dicksonia arborescens. 3. Cyathea elegans. 4. Cyathea arborea. 5. Hemitelia speciosa. 6. Drynaria coronans. 7. Platycerium grande. 8. Bird's nest fern. 9. Asplenium lucidum.

and each cluster is often covered until ripe by a fold of the leaf membrane called an *indusium*.

The order of ferns is divided into suborders, most botanists recognizing as many as eight, founded upon the structure, manner of attachment, and mode of opening of the sporangia. By far the largest of these suborders is the *Polypodiaceæ*, or true ferns, which includes the great majority of those with which we are familiar in the wild state or in cultivation. There are now no fewer than 2,235 species of ferns described; some botanists raise the number above 3,000. They are found all over the world, but especially in the warmer and moister climates; thus in the Antilles they comprise $\frac{1}{10}$ of the vegetation, in Oceania $\frac{1}{4}$ or $\frac{1}{3}$, in St. Helena $\frac{1}{3}$, in Juan Fernandez $\frac{1}{2}$, and in England $\frac{1}{335}$. The Hawaiian Islands and New Caledonia are very rich in species. The tree ferns are chiefly confined to the torrid zone.

Fern, or Farne Is'lands, group of seventeen rocky islets off the NE. coast of Northumberland, England; has two lighthouses because of its perils to mariners. St. Cuthbert died here, and his stone coffin is still pointed out. The steamer *Forfarshire* was wrecked here, 1838, when nine persons were saved by the heroism of Grace Darling, the daughter of a lighthouse keeper.

Fernandez, Juan, 1526–76; Spanish navigator; b. Cartagena; discovered and colonized the island bearing his name and made memorable by De Foe's "Robinson Crusoe"; also discovered Easter, St. Felix, and St. Ambrose islands.

Fernandez, Navarette (surnamed EL MUDO, "The Dumb"), 1526–79; Spanish painter; b. Logrono; one of the most distinguished of Titian's pupils; painter to Philip II, for whom he adorned the Escurial with some of its finest pictures. His chief works include a "Martyrdom of St. James," a "Nativity of Christ," "St. Jerome in the Desert," and his masterpiece, "Abraham with the Three Angels."



COMMON FERN, SHOWING THE UNDERGROUND STEM WHICH SENDS THE FEW LARGE FOLIAGE LEAVES ABOVE THE SURFACE.

Fernandez de Cor'dova, Diego (Marquis of Guadalcazar); Spanish administrator of the seventeenth century; probably a native of Cordoba, and descended from Gonzalo de Cordoba, called "the great captain"; Viceroy of New Spain or Mexico, 1612–21, and of Peru, 1622–29. The incursions of the corsairs, especially of the Dutch, had now extended to the Peruvian coasts; Jacob l'Heremite blockaded Callao four months, and attempted to take Lima;

one of the treasure ships was captured by Heyn; much of the coast was ravaged; the miners of the Potosi district engaged in a bloody faction war, which was ended with difficulty.

Fernandez de la Cueva (kwē'vä), **Francisco,** b. abt. 1610; Duke of Albuquerque; Spanish administrator; Viceroy of New Spain or Mexico, 1653–61. His term was marked rather by lavish display and expenditure than by real benefit to the country. The great cathedral of Mexico City was finished and dedicated during this period. After his return to Spain he was Viceroy of Sicily.

Fernandez de la Cueva Henriquez (ĕn-rē'kĕth), **Francisco,** Duke of Albuquerque, Spanish administrator; grandson of Francisco; Viceroy of New Spain, 1702–11. Like his grandfather he was given to display, and his wealth enabled him to surpass his predecessors in magnificence; few courts of Europe equaled that of Mexico in pomp. By his order various new towns were founded in the N., among others that of Albuquerque, N. M., so named in his honor.

Fernandez de Palencia (pä-län'thē-ä), **Diego,** abt. 1520–81; Spanish author; b. Palencia; went to Peru, 1545, or earlier, and served in the civil war against the rebel Giron, 1553–54. He was made historiographer by the Viceroy Mendoza, 1556, and began the work which was extended and finished after his return to Spain, and published in Seville, 1571 as "First and Second Part of the History of Peru." It covers the rebellions of Gonzalo Pizarro and Giron, and is one of the principal authorities for this period.

Fernan'do de Noronha (nō-rōn'yä), island in the S. Atlantic Ocean, belonging to Brazil; 8 m. long, by a mean breadth of 2 m.; has a mountainous, wooded surface; is used as a penal settlement. It was discovered in 1503 by the Portuguese navigator whose name it bears.

Fernando Po, volcanic island belonging to Spain; in the Bight of Biafra, W. coast of Africa; 20 m. from the Kamerun coast; is rectangular, 44 m. by 20, with a ridge of mountains extending through it and culminating in Ste. Isabelle, 10,700 ft. high; is covered by a luxuriant forest; has a fertile soil and salubrious climate. The island was discovered in 1471 by Fernao da Pao, a Portuguese navigator; was occupied by Spain, 1778, abandoned, 1782; was occupied by the British, 1827; abandoned, 1834; Spain resumed possession in 1844, and now uses it as a penal settlement; capital, Clarence Cove, a port on the N. coast; exports, India rubber and palm oil. The population numbers abt. 15,000, nine tenths being natives called Bobies, or Amigos, who are stupid, repulsive in appearance, and hostile to immigrants.

Fero'nia, Italian goddess concerning whose cultus and myth little is known. She has been variously regarded as goddess of the earth, of the inferior world, of commerce, and of liberty. She appears to have been especially honored among the Sabines; and the chief seat of her worship was Feronia, at the foot of Mount Soracte.

Ferrara (fĕr-rä'rä), capital of the Italian province of same name; on the Volano branch of the Po, 38 m. NW. of Ravenna. The bishopric of Ferrara dates from 661, the archbishopric from 1735. A general council was convened here, 1438, but was removed to Florence. In the fifteenth century it was famous for its school of painting, and in the sixteenth for learning, poetry, art, and the splendor of its ducal court. In its most prosperous period it had about 100,000 inhabitants. The churches contain fine works of art. The university, founded 1321, now comprises schools of jurisprudence and medicine only. Ferrara possesses one of the finest and largest theaters of Italy, and a botanic garden. In the center of the city is a castle, flanked with towers and surrounded by wet ditches, formerly the palace of the dukes. The city is inclosed with walls, and defended by a citadel. Pop. (1901) 33,153.

Ferrara, Coun'cil of, ecclesiastical council whose sixteen sessions were in continuation of the Council of Basel, and which began January 8, 1438. In March of that year it was visited by the Byzantine emperor, John Palæologus, with 700 followers, including the Patriarch of Constantinople, the emperor hoping, by obtaining a union of the Eastern and Latin churches, to gain the aid of the West against the Turks. On April 9, 1438, the council was opened as a union council of the two churches, and discussed principally their points of difference. In January, 1439, the council was transferred to Florence.

Ferrari (fĕ-rä'rē), **Gaudenzio,** 1484–1550; Italian painter; b. Valduggia, Piedmont; his chief works illustrate the story of creation and the early events of Christianity. Probably the best three are "The Crucifixion," "The Passion," and "St. Paul in Meditation."

Ferrari, Giuseppe, 1811–76; Italian philosopher; b. Milan; Prof. of Philosophy successively at Rochefort, Strassburg, Turin, Milan, and Florence; also member of the Italian Parliament. His most important works are an "Essay on the Principle and Limits of the Philosophy of History," and a "History of the Revolution of Italy." He was the foremost Italian representative of positivism.

Ferraris (fĕr-rä'rēs), **Galileo,** 1847–97; Italian physicist and electrical engineer; b. Livorno-Vercellese; chiefly known for his researches in applied electricity, and recognized as the foremost of Italian electrical engineers. In 1886 he organized in Turin the Electro-technical School for Engineers, the first school in electrical engineering established in Italy; 1891, Ferraris's method for the polyphase transmission of power had its first practical illustration in the transmission of 100 electrical horse power from the waterfalls at Lauffen to the electrical exhibition grounds in Frankfort, more than 100 m.

Ferreira (fĕr-rä'ĕ-rä), **Antonio,** 1528–69; Portuguese poet; b. Lisbon; with his model, Sá

de Miranda, was the founder of the patriotic classical school of Portuguese poetry. He wrote many sonnets, odes, epigrams, and a tragedy, "Inez de Castro"; but the best of his works are his epistles.

Fer'rer, Rafael, 1570–1611; Spanish Jesuit missionary; b. Valencia; was sent to Peru; took part in founding the Jesuit convent at Quito, 1593, and labored among the Yumbos Indians; penetrated to the territory of the savage Cofanis, in the forest E. of the Andes, 1601, and established them in mission villages; was employed in exploring the Napo, 1605–7. Returning to his Cofani missions, he was murdered by an Indian whom he had forced to renounce polygamy.

Fer'ret, carnivorous mammal (*Putorius furo*) of the weasel family, so closely allied to the European polecat (*P. fœtidus*) that many regard it as a delicate albino variety of the latter. It breeds freely with the polecat, has red eyes, a white or yellowish fur, and is so tender



FERRET.

that the winters of England are too severe for it unless it is well housed. It is probably of African origin; is half domesticated in Europe. It is much employed in hunting rabbits and rats, but often has to be muzzled, as otherwise it will suck its victim's blood and leave the body in the burrow. It is fierce and treacherous, sometimes severely biting the hand of its master.

Ferricyanides (fĕr-rĭ-sī'ă-nīds), chemical compounds formed by the action of oxidizing agents on ferrocyanides, from which an atom of the metal is extracted; may be regarded as compounds of ferric cyanide (Fe_2Cy_6) with some other cyanide. The chief of these is potassium ferricyanide, the dark-red, crystalline salt known as red prussiate of potash. From it is derived "Turnbull's blue" (ferrous ferrocyanide).

Ferrier (fĕr'ĭ-ĕr), **James Frederick,** 1808–64; Scottish metaphysician; b. Edinburgh. In 1842 he became Prof. of History in the Univ. of Edinburgh, and, in 1845, of Moral Philosophy at St. Andrews. His principal works are "Institutes of Metaphysics: the Theory of Knowing and Being," and "Lectures on Greek Philosophy." He edited the works of his father-in-law, Prof. John Wilson.

Fer'ris Wheel, a gigantic revolving wheel, designed and constructed for the World's Columbian Exposition by G. W. Ferris, an American engineer. It had a tension-spoke wheel 250 ft. in diameter, carrying between its two rims thirty-six coaches, seating sixty persons each, to a height of 250 ft. It ran perfectly from its first revolution until the end of the Exposition, and, besides being an engineering success, proved popular and immensely profitable. It cost $350,000, and sixty persons were employed in operating it.

Fer'ro, smallest and least fertile of the Canary Islands; area, 106 sq. m. As it is the most westerly of the archipelago, it was by early geographers considered the westernmost point of the world, and they drew through it the first meridian. That is still used as the prime meridian on maps designed to show all of Europe as lying in the E. hemisphere.

Ferrocyanides (fĕr-rō-sī'ă-nīds), chemical compounds of the salt kind, consisting of ferrous cyanide ($FeCy_2$) united with some other cyanide, *e.g.*, with potassium cyanide. Refuse animal matters, iron filings, and commercial potash are melted together, and the mass poured into hot water, filtered, evaporated, and repeatedly crystallized, yielding pure potassium ferrocyanide—yellow prussiate of potash. Several other processes for obtaining this salt have been invented. Ferric ferrocyanide is commercial "Prussian blue."

Ferrol', El, fortified seaport of Spain; province of Corunna; 11 m. NE. of Corunna; has a harbor, surrounded by splendid dockyards, formed by an inlet of the Bay of Betanzos, so narrow as to admit only one battle ship at a time, and defended by the castles of San Felipe and Palma. Ferrol is one of the chief naval arsenals of Spain, and has sardine fisheries and manufactures of naval stores, cotton, and leather. Pop. (1900) 25,280.

Ferry (fā-rē'), **Jules François Camille,** 1832–93; French statesman; b. St. Dié; admitted to the Paris bar, 1851; connected with the *Gazette des Tribunaux*; began contributing to the *Temps*, 1865, in which he attracted attention by attacks on Baron Hausmann's administration of Paris (1868). He was elected to the Corps Législatif from Paris, 1869; was a member of the government of the national defense, 1870; Minister of Public Instruction and Fine Arts, 1879–80 and 1882; President of the Council, 1880–81; Prime Minister and Minister of Public Instruction, 1883–85; 1880, caused excitement by his Education Bill, which forbade the unauthorized orders (Jesuits) to teach in the schools. The provision was rejected by the Senate, but the minister succeeded by enforcing some old laws long fallen into oblivion. This led to the downfall of the ministry, but he formed another cabinet, and remained Prime Minister until 1881, when he was forced to resign on the Tunis question.

In 1883 he became Prime Minister again; his colonial policy then led to the war in Tonquin, the unsatisfactory issue of which culminated in his overthrow, 1884. He retired one of the most unpopular men in France. In

1887 he was an unsuccessful candidate for the presidency, and just after the election he was shot by Aubertin. He retired from public life for a time, but was reëlected to the Chamber, 1890, and was soon made Senator; February 25, 1893, was elected President of the French Senate. He was the most distinguished of the few great men in France who were not involved in the Panama scandal, and was regarded as almost certain to succeed to the presidency of the republic on the retirement of M. Carnot.

Fer'ry, term applied (1) to a boat used to carry passengers and goods across a river or similar body of water, (2) to the place where such boat plies, (3) to the right of franchise granted by the state to an individual or corporation to conduct such a transportation business, as a common carrier. Across small streams a ferry is usually propelled by oars or punting, while larger boats may be drawn across on a chain, or have steam or other motive force. The large ferryboats operating round New York City are double ended, so that they may cross to and fro without turning around. They carry not only thousands of passengers, but loaded teams, and special ferryboats take complete trains of railroad cars from one river terminus to another.

Fersen (fĕr'zĕn), **Axel** (Count), abt. 1750–1810; Swedish soldier in the American Revolutionary War; aid-de-camp of Rochambeau at Yorktown. In the flight of the French royal family to Varennes (1791), he was their disguised coachman. Later he was grand marshal of Sweden; was killed by the mob at the funeral of the Crown Prince Christian Augustus, whom he was suspected of having poisoned. It is universally acknowledged that he was guiltless.

Fertilization of Plants. See CROSS FERTILIZATION.

Fer'tilizers, substances which enrich the soil and promote the growth of plants. Agriculturists distinguish between homemade and artificial mineral or commercial fertilizers. The former consist mainly of the various refuse matters, animal and vegetable, incidental to farm operations. The latter include many articles obtained elsewhere than from the farm. The use of animal secretions of every description, and of all kinds of vegetable refuse matter in the form of barnyard manure and farm composts, has been known in agriculture from time immemorial, while the application of the commercial fertilizers can scarcely be dated further back than to the close of the eighteenth or the beginning of the nineteenth century. The use of artificial fertilizers is an important feature in the present management of farms. Their merits are so generally recognized that a thorough system of agriculture is thought impracticable without their assistance, particularly when their application renders the stable manure a complete fertilizer for the various crops under cultivation. Lime, salt, saltpeter, oyster shells, gypsum, and ground bones were among the first commercial fertilizing substances. The consumption of these and similar articles was small until Prof. Justus von Liebig made his famous exposition of the relations which exist between the constituents of the soil and the growth of plants.

Fescennine (fĕs'sĕn-nĭn) **Verse**, in ancient Italy, a rude and generally extemporaneous kind of poetry, often roughly satirical and licentious, sung at first in rustic communities at harvest-homes and weddings, and afterwards introduced into Rome, where it was long popular. The name is derived from Fescennium, an Etruscan city near Falerii. Originally such verse was in form a dialogue.

Fesch (fĕsh), **Joseph**, 1763–1839; French prelate; half-brother of the mother of the first Napoleon; b. Ajaccio, Corsica; commissioner attached to the French Army of Italy, 1795–99; Archbishop of Lyons, 1802. He was made ambassador to Rome and cardinal, 1803; Grand Almoner and Senator, 1805; President of the Council of Paris, 1811. In this latter year he retired in disgrace to Lyons for opposing Napoleon; on Napoleon's second fall (1814) retired permanently to Rome, and there died.

Fes'cue, any one of numerous species of grass of the genus *Festuca*, which abound in most temperate regions of the globe. The sheep's fescue and the tall fescue (*F. ovina* and *F. elatior*) are excellent pasture and forage grasses.

Fes'senden, William Pitt, 1806–69; American statesman; b. Boscawen, N. H.; practiced law at Bridgeton, Me., and after 1829 at Portland; served as a Whig in the State Legislature, 1832, 1840; member of Congress, 1841–43; returned to the Legislature, 1845, 1846, 1853; U. S. Senator, 1854–64; Secretary of the Treasury, 1864–65; U. S. Senator, 1865–69. On the impeachment of President Johnson, he voted for acquittal.

Fes'tus, Porcius, d. abt. 62; procurator of Judea; succeeded Antonius Felix A.D. 60, while Nero was emperor. On arriving in Judea as governor he found the Apostle Paul a prisoner, examined his case, refused to gratify the vindictive feelings of the Jews against him, and would have set him at liberty; but as the apostle had appealed to Cæsar (*i.e.*, Nero), he sent him to Rome to lay his case before the emperor.

Festus, Sextus Pompeius, Latin grammarian and lexicographer; of uncertain date, but after Martial (A.D. 100), from whom he quotes, and before Charisius and Macrobius (400 A.D.), who quote from him. No particulars of his life have come down apart from his connection with the great work of Verrius Flaccus, "De Significatu Verborum" (On the Meaning of Words). Festus prepared an abridgment of this work, which he arranged under the letters of the alphabet in twenty books.

Fetialis (fē-shĭ-ā'lĭs), one of a small college of ancient Roman priests who had charge of certain international affairs, acting as heralds in the announcement of war to a foreign state, and presiding over the solemnities attending the return of peace. They were probably

twenty in number, were anciently citizens of high birth, chosen for life, and called *patres patrati*. Their duties were performed with much ceremony, and their rites and regulations formed a code known as the *Jus fetiale*.

Fetich (fē'tĭsh). See FETISH.

Fétis (fā-tēs'), **François Joseph**, 1784–1871; Belgian writer on music and biographer; b. Mons; was made organist and Prof. of Singing at Douai, 1813; director of the Conservatory at Brussels, 1833; member of the Academy of Belgium, 1845; musical executor of Meyerbeer, producing his "Africaine," 1864; officer of the Legion of Honor in 1864; grand officer of the Order of Leopold, 1869. He published treatises on music, a "Universal Biography of Musicians," and "General History of Music"; founded and edited the *Revue Musicale*.

Fe'tish, object worshiped by the tribes of Senegal and Kongo. A fetish is not an idol, and is not properly a symbol, but is looked upon as the actual and visible dwelling place of a preternatural power. It may be thus some fixed object of nature, as a mountain or a tree; it may be an animal, as a snake or a crocodile, and often is a sheep or a goat; or it may be any object on which the fancy has fixed, as the beak of a bird, the hoof of a quadruped, a stone, a feather, a nail, or almost anything else. One thing will do about as well as another for a fetish, provided the worshiper can believe that his god resides therein; and this he is easily led to do in reference to anything which pleases or is useful to him. Often a fetish is worn about the person or hung up in the hut as a talisman or preservative charm, and is employed in the most disgusting rites of superstition and witchcraft. See ANIMISM.

Fetus (fē'tŭs), the young of viviparous animals during the greater part of their existence before birth, such animals being those which bring forth young already formed and moving. The intrauterine life of the human product of conception is divided into three epochs: the stage of the ovum, of the embryo, and of the fetus. To the stage of the ovum belong the first two weeks of existence, including the period from the moment of conception to the formation of the rudiments of the future being. The embryo stage embraces from the second to the close of the fourth week, the period of greatest developmental activity, during which the principal organs are established and the provisional division effected by transient embryonal structures, as the somites, (longitudinal sections), visceral arches (cavity covers), etc., is replaced by permanent differentiation resulting in definite form. After the third month the fetus is developmentally complete, the further increase resulting from the growth and perfecting of parts already established, and not by the addition of new structures. The growth is very rapid during the third, fourth, fifth, and especially sixth months, the weight of the fetus within this time increasing over a hundredfold. During intrauterine life the sustenance and respiration of the fetus are carried on by materials absorbed from the maternal blood through the placenta and umbilical cord. So that the digestive glands remain imperfectly developed until called into action by the taking of food, *i.e.*, until birth. At the time of birth the fetus possesses an average length of from 20 to 21 in., and an average weight of about 7 lbs.

Feu'dal Sys'tem, the condition of society that prevailed in most of Europe during the Middle Ages. The system grew up from the fifth to the ninth century, and was the consequence of the struggle of civilization against barbarism. In France it existed in a crude form for some generations before the extinction of the Carlovingian dynasty, and many of its incidents are traceable in legislation to the reign of Charlemagne. At the conquest of Gaul, and the rise of the Merovingians, there were many freeholds—that is, independent properties; but in the five following centuries most of these disappeared. The beneficiary condition became the common condition of landed property. "Benefice" and "fief" are words expressing the same facts at different dates. In the middle of the twelfth century, and for some time previously, *feodum* and *beneficium* were used interchangeably.

The exact nature of benefices has been a subject of dispute, but the better opinion is that their ordinary duration was the life of the possessor, after which they reverted to the fisc; yet there were instances of hereditary benefices as early as the Merovingian times. Dukes, counts, and marquises or margraves, were at first provincial governors. The Carlovingians sought to lessen their power, and with some success so long as that race produced able rulers; but under Charlemagne's successors the counts rapidly acquired wealth, influence, and political station. They usurped their governments as sovereignties, with the domains and regalian rights (*e.g.*, the coinage), subject only to the feudal, or military, superiority of the king. In Italy the dukes were still more independent; and in Germany, throughout the tenth century, the great fiefs of the empire were granted, almost invariably, to the heirs of the last possessor. The king and the law could not protect the allodialists, or independent proprietors, from being spoiled by the counts; yet the allodial lands were not entirely extinguished. In the German Empire many estates continued to be held by allodial tenures.

By the edict of Milan, issued in 1037 by Conrad II, Emperor of Germany, four regulations are established: "that no man should be deprived of his fief, whether held of the emperor or a mesne lord, but by the laws of the empire and the judgment of his peers; that from such judgment an immediate vassal might appeal to his sovereign; that fiefs should be inherited by sons and their children, or on their failure by brothers, provided they were *feuda paterna*, such as had descended from the father; and that the lord should not alienate the fief of his vassal without his consent." This edict is thought to mark the full maturity of the feudal system, and the last stage of its progress. Of feudal relations, support and fidelity were the principal. The vassal

owed service to his lord, and the lord protection to his vassal. If the vassal failed in his obligation, his land was forfeited; if the lord failed, he lost his seigniory. As respected the king, the relations were loose and shifting. The ceremonies on conferring a fief were principally homage, fealty, and investiture. Nearly a hundred varieties of investiture are mentioned. The vassal's duties commenced with his investiture. They varied with place and time. Military service depended upon circumstances.

The feudal system was exclusive in its spirit. In strictness, a person not noble by birth could not possess a fief. Three descents were necessary to remove fully the stain of ignoble blood. Children born of an ignoble mother, in lawful wedlock, were regarded as of illegitimate origin. The higher clergy, as prelates and abbots, were feudal nobles. Ecclesiastical tenants came within the scope of feudal duty. Below the gentle classes were the freemen and the serfs. The former were dwellers in chartered towns, and were destined to have an important part in destroying the feudal system; and in England the yeomanry, to whose existence that country owed its leading place in the military system of Europe, were also among the freemen. The serfs, or villeins, were among the most abject of mankind. In some countries a distinction was made between villeins and serfs, the latter being subject to the will of their masters, however capricious, while the obligations of the former were defined. There were several causes for the decline of feudalism. The two extremes of society were alike interested in its destruction—the king, whose power it threatened, and the downtrodden people. Chivalry, an offspring of feudalism, was injurious to the system whence it sprung. The crusades helped to prepare the way for its fall. The growth of the towns, the increase of commerce, the development of the commercial spirit, the acquisition of military knowledge by the people, and scientific inventions and discoveries, particularly the use of gunpowder in war, aided its downfall.

Feuillants (fö-yän'), reformed Cistercian monks and nuns; so called from *Feuillans*, a village near Toulouse, where their first abbey was situated. Jean de la Barrière, abbot of Feuillans (d. 1600), began the reform in 1567; their first house in Paris was instituted, 1588; their severe rule was mitigated, 1595. In 1630 the congregation was divided into that of Notre Dame de Feuillans and the reformed Bernardines (the latter Italian). Nuns were admitted, 1588.

The club founded in Paris in 1790 by Lafayette, Sieyès, La Rochefoucald, and others, and which advocated moderate opinions, called itself Feuillants, from the convent in which they met. March 28, 1791, it was broken up by a mob. The name "Feuillants" was, 1791, given to the Right and the Extreme Right in the French Legislature.

Feuillet (fö-yā'), **Octave,** 1812–90; French novelist and dramatist; b. St. Lô, Manche; began his literary career, 1844, as "Désiré Hazard"; contributed to newspapers and periodicals; wrote novels, comedies, dramas, and farces. Among his dramas are "Onesta," "The Crisis," and "Redemption"; among his novels, "The Romance of a Poor Young Man," "The History of Sibylla," and "Julia de Trecœur," the last being dramatized as "The Sphinx." He succeeded Eugène Scribe in the French Academy, 1862.

Feuilleton (fö-yĕ-tôn'), in French journalism, the name of that part of the sheet which contains the literary intelligence, criticism, and other similar matter. The feuilleton often contains tales, complete or serial; hence a romance written for a journal is sometimes called a feuilleton.

Féval (fā-väl'), **Paul Henri Corentin,** 1817–87; French novelist; b. Rennes; was admitted to the bar, but soon became an author. Among his novels are "The Lover of Paris," "The Duke's Motto," "The Woman of Mystery," "The Fairy of the Strands," and "Thrice Dead."

Fe'ver, a condition of the animal body characterized by a measurable and continuous elevation of the general temperature. This definition excludes short accessions of heat due to accidental and ephemeral causes, and limits the term fever to a state which is a concomitant of disease. In fever the functions of the body are disturbed, usually in proportion to the variation from the normal heat of the body (37° C., 98.6° F.). Fever is always and only a condition dependent upon a disorder of some part or system of the body, although certain diseases are commonly called fevers because a rise of temperature is in them a constant symptom, as typhoid fever, scarlet fever, etc.

In fever there is a definite order of events, spoken of as the stages of (1) invasion, (2) domination, (3) decline. In a typical fever the first stage is marked by general *malaise*, bodily as well as mental languor, sometimes headache, with pains in the back and limbs, loss of appetite, an accelerated and rather small pulse, great sensitiveness of the skin, and often a *chill*. This stage gives way to a sensation of heat. The skin becomes turgid and congested, feels hot and dry, the pulse remains quick, but is fuller; the respiration is more hurried and irregular, there is general restlessness, intense thirst, the tongue is coated, the mouth and throat dry, and the urine is scanty, of deep color, and of high specific gravity. After this stage, the skin breaks out in a profuse *sweat*, the severity of the symptoms diminish, the patient grows calmer, and often falls into a sleep, awaking with a pleasant sensation of well being, although more or less debilitated.

The name of some fevers is derived from some real or supposed cause or predominating symptom — *e.g.*, typhus, eruptive, breakbone, spotted, scarlet, yellow, malarial, septic, hay, jail, ship fever. The febrile process does not run through its stages with an even tenor, but shows exacerbation and remission. The exacerbation usually sets in in the evening and advances until about midnight, when the remission commences, reaching its lowest point

in the morning. If the temperature never falls to the normal point, the fever is called a *continued* or *continous* one. If at some time it falls nearly to the normal point, the fever is called *remittent*. If the febrile symptoms disappear altogether, to return on another day, the fever is called *intermittent*; if lasting for several days, then disappearing and returning after a few days' intermission, it is called *relapsing* fever.

One symptom which is never wanting in fever can be measured with mathematical exactitude, and furnishes a standard of comparison between fevers of different degrees of severity: it is the *increase of the temperature* of the body as determined by the thermometer. The thermometer furnishes not only an indication of the progress of any fever, but is a valuable aid in discriminating between different diseases in which fever is a prominent symptom, since in different fevers there are characteristic alterations of temperature. According to their severity, temperatures are classed as: Subfebrile (99.5° to 100.5° F.), slight fever (100.5° to 101.5°), moderate fever (morning, 101.5°; evening, 103.5°), high fever (morning, 103°; evening, 105°), hyperpyrexia (above 106°). See ANIMAL HEAT; TEMPERATURE OF THE BODY.

Fever Bush, handsome shrub of the laurel family; common in the N. U. S. Decoctions



FEVER BUSH.

of its bark and leaves have been used for aromatic and stimulant drinks in low fevers. It is also called spicebush and benjamin tree.

Fe'verfew, large perennial herb of the composite family, resembling camomile, and a native of Europe, sparingly naturalized in the U. S. There are some fine cultivated varieties, which are prized in the flower garden. It was formerly used in medicine as an aperient, tonic, and febrifuge. A related species yields the so-called Persian insect powder.

Feyen-Perrin (fā-yăn'pā-răn'), **François Nicholas Augustin,** 1829–88; French genre painter; b. Bey-sur-Seille, Meurthe-et-Moselle; studio in Paris. He mostly painted pictures of fisher life. His "Return of Fisher Girls at Cancale" is in the Luxembourg Gallery, Paris.

Fez, chief of the three capitals of Morocco and frequent residence of the sultan; 160 m. SSE. of Tangier, with which it is connected by only a bridle path. It is a picturesque city from without, but filthy within; is the commercial center of the country, and has manufactures of silk, wool, and leather. It was built probably, 793, and was long the capital of the Mohammedan states of W. Africa. Once a great seat of learning, and still held in veneration. The Turkish cap or "fez" was, until recent times, made here exclusively. Pop. abt. 140,000.

Fezzan (fĕz-zăn'), in N. Africa; bounded N. by Tripoli, and on the other sides by the Sahara; forms with Tripoli and Barka a province of Turkey. Most of Fezzan is a silent and barren desert with oases here and there. Only one tenth of the soil is cultivable. The climate is in summer extremely hot, and at all seasons very dry. The inhabitants, estimated at abt. 26,000, are a mixed race of Berber Tuaregs, Arabs, and negroes. They are governed by a sultan, who pays tribute to the viceroy of Tripoli. Murzuk is the capital, and the rendezvous for the caravans coming from Cairo, Tripoli, and Timbuctu, which occasion a considerable trade.

Fi'ber, delicate, threadlike portion of plant or animal tissue; also a substance composed of such filaments. Man has for ages availed himself of the filamentous character of parts of plants to make clothing, utensils, instruments of the chase, and shelter for himself. The animal kingdom has also been laid under contribution from the earliest times; and even the mineral kingdom contributes, in the substance known as asbestos, a fiber which has various uses in the arts. Among the most useful vegetable fibers are cotton, flax, hemp, jute, ramie, esparto, and cocoanut, since from one or the other are made wearing apparel, thread, cordage, twine, brushes, etc. The use of flax in making thread and cloth can be traced further back than that of any other vegetable fiber. The fiber of some trees, especially the linden, poplar, and spruce, is used for making paper.

Fi'brin, organic substance formed from the blood and lymph. From the former it is obtained in the proportion of two or three parts per 1,000; in the latter in smaller quantity. Fibrin itself does not exist in the blood, but certain elements which together make fibrin do. These "fibrin factors" are increased in inflammatory conditions, and therefore the blood clots easily—a blood clot being largely fibrin. In wasting conditions fibrin factors are decreased, and clotting is slow. This clotting of the blood is of the utmost importance, for, when a blood vessel is wounded or cut across, the fibrin of the blood which is poured out coagulates on the edges of the vessel, forming a plug, so that no more blood can escape.

Fibula (fĭb'ū-lă). See LEG.

Fichet (fē-shā'), **Guillaume,** French educator; b. Aunay, early in the fifteenth century; in

1467 he was chosen rector of the Univ. of Paris; also teacher of rhetoric, theology, and philosophy. By his influence the first printing press was brought from Germany and set up in the Sorbonne. Among the first books printed in France were his "Rhetoricorum Libri Tres" (probably 1470) and "Epistolæ, in Parisiorum Sorbona." Fichet afterwards held office at the papal court of Sixtus IV.

Fichte (fĭch'tĕ), **Immanuel Hermann von**, 1797–1879; German philosopher; b. Berlin; son of Johann; Prof. of Philosophy at Bonn, 1835–42, and at Tübingen, 1842–63; was converted to spiritualism; ennobled, 1867. His works include a "System of Ethics," "The Soul Question," "A Philosophic Confession," and "Speculative Theology."

Fichte, Johann Gottlieb, 1762–1814; German philosopher; b. Rammenau, upper Lusatia; studied theology at Jena and Leipzig, and adopted a fatalistic view; 1790, began the study of the "Critique of Pure Reason," and other works of Kant; found thus a new world, and began to live a higher life. He published anonymously an "Essay toward a Critique of All Revelation," 1792, written in five days and originally used as a letter of introduction to Kant, which placed him in the foremost rank of philosophers. In 1794 he became Prof. of Philosophy at Jena, and published "Science of Knowledge," which was adopted by thinkers of the Kantian school. An essay printed in a periodical, "On the Ground of our Faith in a Divine Government of the World," not to mention an earlier work in which he had attempted to justify the French Revolution, resulted in his dismissal. He repaired to Berlin, where he published eloquent popular expositions of his system, the most prominent of which are "Destination of Man," "The Sun-clear Report to the Public upon the True Nature of the Latest Philosophy—an Attempt to Force the Reader to an Understanding of It," "The Way to the Blessed Life." An outline of the philosophy of history appears in his "Characteristics of the Present Age." In his "Addresses to the German Nation" he took a bold stand against Napoleon (1808). He became rector of the Univ. of Berlin on its establishment, and exerted a powerful influence on its constitution.

Fichtelgebirge (fĭch'tĕl-gĕ-bēr-gĕ), short, broad range of mountains, covered with firs and pines, on the N. frontier of Bavaria; the highest peak, Schneeberg (Snow Mountain) is about 3,450 ft. high. They form the nucleus from which all the chief ranges of Germany diverge, and they divide the affluents of the German Ocean from those of the Black Sea.

Ficino (fĭ-chē'nō), **Marsilio**, 1433–99; Italian Platonic philosopher; b. Florence. Cosmo de' Medici selected him, as a youth of great promise, to be educated in the mysteries of Platonism, with the design of naturalizing this philosophy in Italy, and made him, at thirty years old, head of the Florentine Academy. Ficino made numerous translations, and published original works, but his chief merit is as the first interpreter and propagator of Plato in the West.

Ficquelmont (fē-kĕl-mōn'), **Karl Ludwig** (Count), 1777–1857; Austrian general; b. Lorraine. In 1811 and 1812 he commanded three regiments of cavalry in Spain under Wellington; in 1814 brought about the capitulation of Lyons; he became Minister of Foreign Affairs in 1839, and in 1848 was Minister of Foreign Affairs and provisional Prime Minister; wrote several political pamphlets.

Fic'tion, in law, a supposition which is known not to be true, but which is assumed in order to bear out a certain conclusion or inference. Fictions have been made use of abundantly in England, but few are now retained except such as have a beneficial purpose; as where the title of an administrator is supposed to have attached at the death of the deceased, in order to enable him to recover for any misuse of the property prior to his appointment. Several rules are laid down in respect to fictions: (1) The law never adopts them except from necessity and to avoid a wrong; (2) they must not be of a thing impossible; (3) are never admitted where the truth will work as well; (4) are not admissible in criminal trials.

Fiction, in literature. See NOVEL.

Fi'cus, plants belonging to the breadfruit family, in which it is associated with the breadfruit of the Pacific, the jack of the Indian Archipelago, the mulberry, the Osage orange of the U. S., and the upas tree; also, any plant of this genus. The common fig tree is the most valued representative of this genus. Many trees of the family yield a remarkable milky juice, which, being thickened, forms caoutchouc, or rubber.

Fid'ei Commis'sum (Latin, "committed to one's trust"); species of trust existing under the Roman or civil law which was employed to effect the testamentary disposition of property to certain persons who by law were incapable of receiving it by direct device or bequest. Exiles, strangers, unmarried persons, those who had no children, and some other classes of persons were under this disability, and whenever a testator desired to evade this law and leave his property to one thus debarred, he selected some person as heir or legatee who was not incapacitated from taking; annexing a request to the gift that he who was thus constituted a recipient of the property should hold what he received in trust for him who was intended as the real object of the testator's bounty.

Fide'næ, ancient Latin city on the left bank of the Tiber, 5 m. above Rome. In Rome's early days Fidenæ was her powerful rival and enemy, but it declined as Rome increased, and before Cicero's time was an insignificant village, important only for its tufa quarries.

Fi'des, in the religious system of ancient Rome, the personification of good faith or honor, which quality the Romans thought fundamental to social organization. In harmony with this conception, Fides was represented as older even than Jupiter; her shrine, the temple of Fides Publica, was reckoned among the oldest at Rome. She was especially revered as

a goddess of international relations, and her temple was a depository of documents relating to such affairs. Her image took various forms; most commonly, in the older period, that of a matron bearing a wreath, carrying ears of corn and a basket.

Fief (fēf), estate or dignity held of a feudal superior upon condition of military service. See FEUDAL SYSTEM.

Field, Cyrus West, 1819–92; American capitalist; b. Stockbridge, Mass.; removed to New York, where he became wealthy in the paper trade; organized in 1854 the New York, Newfoundland, and London Telegraph Company, which two years later finished lines from New York across Newfoundland, and one from Newfoundland to Cape Breton Island. He organized in London, 1856, the Atlantic Telegraph Company, which, after several failing attempts, laid a cable between Ireland and Newfoundland, finished in 1866, and completed another which had parted while it was being laid (1865). Later he engaged in other large enterprises, among them the construction of elevated railroads in New York.

Field, Eugene, 1850–95; American journalist and poet; b. St. Louis, Mo.; was connected with newspapers in Missouri and Colorado, 1873–83. In 1883 he joined the Chicago *Daily News*. Among his publications are "A Little Book of Western Verse," "A Little Book of Profitable Tales," "With Trumpet and Drum," "A Second Book of Verse," "The Holy Cross, and Other Tales," and "Love Affairs of a Bibliomaniac." With his brother, Roswell Martin Field, he published "Echoes from the Sabine Farm."

Field, in electricity. See DYNAMO; ELECTRIC MOTOR.

Field'fare, English name for a species of thrush, *Turdus pilaris*, found in Europe; commonly occurs in England as a bird of passage, though it breeds in the N. parts of that country and in Scotland.



FIELD FARE.

Field Glass, form of magnifying apparatus which is essentially a telescope of low power. It may have a single tube (like the antiquated spyglass), or more frequently it is binocular, resembling in form the double opera glass. In the modern form the magnifying power is increased by inserting reflecting prisms between the object glass and the eyepiece. See TELESCOPE.

Field'ing, Henry, 1707–54; English dramatist and novelist; b. Sharpham Park, near Glastonbury; produced a comedy, "Love in Several Masques," 1728, and between that date and 1737 wrote twenty-three pieces for the stage, most of them comedies and farces, only one of which, the "Tragedy of Tragedies," was decidedly successful. His "Pasquin, a Dramatic Satire on the Times," 1736, and "The Historical Register for 1736" attracted so much attention that the Licensing Act, placing the stage under ministerial control, was passed. Turning to the law, Fielding was admitted to the London bar in 1740, and soon had compiled a valuable work on crown law. His first novel, "The Adventures of Joseph Andrews," was published in 1742. The next year he produced "The Wedding Day," a comedy, and his "Miscellanies," the third volume of which consists of "The History of Jonathan Wild the Great." During the rebellion of 1745–46 Fielding published a political journal, *The True Patriot*, and in 1747–48, another, *The Jacobite Journal*. He was appointed Justice of the Peace for Middlesex and Westminster in 1748, and Chairman of the Sessions, 1749. His masterpiece, "The History of Tom Jones," appeared in 1749, and another novel, "Amelia," in 1751. In 1752 he published a literary journal, *The Covent Garden Journal*; died near Lisbon, Portugal, while on a journey for his health.

Field Mice, mice which live out of doors and do not frequent houses; especially the genus *Arvicola*, of which there are more than six species in the U. S. Europe has also several species, and in Great Britain these mice are in some years extremely destructive, not only to grain crops, but to orchard and forest trees, whose bark they gnaw.

Field Of'ficer, in the army, a colonel, lieutenant colonel, or major of a battalion or regiment, as distinguished from general officers, who are superior to field officers in rank; from line officers, who are inferior; and from staff officers, general or regimental, who may be of rank superior, equivalent, or inferior to that of field officers.

Field of the Cloth of Gold, place on the border of Calais where occurred the interview between Henry VIII of England and Francis I of France, in June, 1520. Francis I and Charles I of Spain, candidates for the imperial crown, sought the friendship of Henry VIII. At this interview the magnificence of the display on both sides gave to the scene the name it bears. Henry VIII had interviews with Charles the same year, and Francis's object was not secured.

Fieri Facias (fī'ē-rī fā'shĭ-ăs), in law, writ of execution, whereby a sheriff, or other officer was ordered *quod fieri, facias, de terris et catallis* (or *de bonis et catallis*), "that you cause to be made out of the lands and chattels," or "the goods and chattels of," etc., a certain sum of money, to which the party for whom the writ was issued was entitled by the judgment of court. It is largely used in the U. S.; and is commonly called a *fi. fa.*

Fi'ery Cross, or **Cranta'ra,** signal used among the Scotch Highlanders as an alarm for the calling of the clans to arms. It was a light wooden cross, whose ends were thrust into a fire and, when charred, dipped in the blood of a goat.

Fiesole (fē-ā'sō-lā), **Fra Angelico da.** See ANGELICO, FRA.

Fiesole (fyĕs'ō-lā), ancient *Fæsulæ*; town of Italy, 3½ m. NE. of Florence, with which it is connected by continuous villas; has a cathedral and an episcopal seminary. Fæsulæ was one of the chief towns of Etruria, became a Roman military colony, was the headquarters of Catiline after his escape from Rome, and was partly destroyed by Florentines, 1010 A.D.

Fife, Alexander William George Duff (Marquis of Macduff and Duke of Fife), 1849– ; British statesman; Liberal member of Parliament, 1874–79; married, July 27, 1889, Princess Louise Victoria Alexandra Dagmar, eldest daughter of the Prince of Wales (later King Edward VII), on which occasion he was created Duke of Fife.—The Duchess of Fife, b. February 20, 1867, became President of the Edinburgh School of Medicine for Women, the first school of the kind in Scotland.

Fife, musical instrument chiefly used with the snare drum in martial music. It is made in one piece, without keys, has six finger holes, and a mouthpiece or hole for blowing upon one side, as in the flute. Its notes are shrill and somewhat harsh. The fife is pitched in various keys.

Fif'teenth, in music, the interval of a double octave, comprising a distance of fifteen grades of the scale, from the lower to the upper note; also, the name of a stop in the organ, of which each pipe is tuned two octaves above the regular pitch as represented on the keyboard.

Fifth, in music, an interval comprising five degrees of the scale, or the distance, *e.g.*, from C to G, D to A, etc. Fifths, according to their position on the scale or the influence of accidentals, are various in their compass, embracing from six to eight semitones. They are usually classified as perfect, diminished, and augmented. The perfect contains three whole tones and one semitone; the diminished, two whole tones and two semitones; and the augmented three whole tones and two semitones.

Fifth Mon'archy Men, small religious sect in England during Cromwell's protectorate and the first part of the reign of Charles II. They professed to believe that the time was near when to the four great monarchies of Daniel's vision was to succeed the fifth, which was to break all others and to "stand forever." Of this Jesus was to be king, and in their eagerness to seize the fitting opportunity to proclaim him they conspired (April 9, 1657) against Cromwell. Again, January 6, 1660), on the prospect of Charles II being restored as king, they made a tumult and attempted to sustain their revolt, under a leader named Venner, by force of arms. The insurrection was suppressed, and Venner and others were executed. The Independents, Baptists, and Quakers disclaimed sympathy with the insurgents, yet they suffered odium and hardships on account of the movement. Two years later another ineffectual rising occurred. The sect seems to have had no connection with Anabaptists on the Continent, but to have derived encouragement from the views of some eminent men.

Fig, fruit of the *Ficus carica,* a tree indigenous to Asia and Barbary, and much cultivated in the warmer regions, where the native fig tree attains a height of 20 ft., with a branching, spreading head, like an apple tree; but in N. countries it is seldom seen except as a shrub, unless trained under glass. In the middle states of the U. S., where cultivated in the open, it is purposely kept low and shrublike, so that it may be bent to the ground and



FIG.

covered with earth in the winter. In England it is usually planted against a low wall, in order that it may receive some of the heat reflected from the surface of the soil. In parts of France it is grown as a dwarf standard tree. The fresh ripened fig is delicious and luscious. Nearly all the dried and pressed figs consumed in the U. S. and Great Britain are produced in Turkey, but California is rapidly coming to the fore as a fig-producing district. Although unknown in Greece during the Homeric age, it was common in the time of Plato; it was early introduced in Italy, and thence in Spain and Gaul. Charlemagne ordered its cultivation in central Europe.

Figaro (fē-gă-rō'), a witty and care-free character, notable for his cleverness in intrigue, introduced in 1775 by Beaumarchais in the

"Mariage de Figaro," "Barbier de Seville," and "Mère Coupable." *Le Figaro* is the name of one of the leading Parisian journals.

Fight'ing Fish, little fresh-water fish of Farther India, akin to the perch family. Two of these fishes placed in a vessel of water will attack each other with the utmost fury, and in India much money is often wagered upon the combat.

Figig (fē-ghĕg'), oasis on the N. edge of the Sahara, 30 m. W. of the boundary between Morocco and Algeria. It is connected by caravan route with the railroad to Oran, has an important trade with Algeria, grows many dates, and with 15,000 inhabitants is one of the most populous oases in the NW. part of the Sahara.

Figueras (fē-gā'räs), **Estanislao,** 1819–82; Spanish statesman; b. Barcelona; became at an early age one of the leaders of the Liberal Party in Catalonia; engaged in the conspiracy of that party in 1866, for which he was imprisoned, 1867. He was prominent in the organization of the republican party after the overthrow of Isabella, 1868; was Provisional President of the Republic, 1873.

Figueroa (fī-gā-rō'ä), **Francisco de,** 1540–1620; Spanish military officer and poet, surnamed El Divino; b. Alcalá de Henares. During his long stay in Italy he acquired such a mastery of Italian that his verse in that language is as pure as that composed in Spanish. His poems, dating from 1572, but not published until 1620, rank among the best contemporary productions in Italian.

Fig'ured Bass, in music, a bass over or under which the harmony is expressed by ordinary figures, dashes, etc., instead of being written out in notes. These figures are not intended to represent the structure or melodious movement of the upper parts, but only the nature and elements of the harmony on which those parts depend. Nor do the figures usually determine the exact positions of chords as played by the right hand on keyed instruments; as such positions may be taken near the bass, or distant from it, or be in either close or dispersed harmony, at the discretion of the performer. The figures represent intervals counted upward from the bass; and generally those intervals which exceed an octave are expressed by figures that denote the same letter within the octave. Accidental flats, sharps, and naturals are used with the figures when necessary, but a sharp is frequently expressed by a stroke drawn through the figure. Figures standing one over the other indicate intervals to be struck simultaneously, but those standing one after the other are to be taken successively.

Fig'ure of Speech, a peculiar or special use of words. The distinction between grammatical and rhetorical figures is of importance in the logical construction of figurative language —a subject on which there is much confused thinking. The grammatical figure rests upon a *real* relation of the subject and predicate. "My Milton is in four volumes," involves a figure or form of speech departing from strict literalness; but it is a grammatical figure, for the relation on which it rests is real, objective, and undeniable; it is, according to the letter, the grammar, and hence has been styled the grammatical. Milton is literally the author of the works contained in the volumes. The two great grammatical figures are metonymy and synecdoche. They may be at home in the plainest and most commonplace prose—in the language of a will or of an advertisement. The rhetorical figure rests upon an ideal or an idealized relation between the subject and predicate. The mind makes it, and can unmake it; it can exist to one mind, and be denied by another; it may be conceded by the mind at one time and in one state, and denied at another time. "Milton is an eagle" involves a metaphor, which is the chief rhetorical figure. Some of the most confused and persistent wars of words have arisen from failing to observe this distinction.

Figures. See NUMERALS.

Fig'worts, family of flowering plants (*Scrophulariaceæ*), with two-lipped or irregular gamopetalous corollas, superior two-celled ovaries, and two or four (rarely five) stamens on the corolla tube. They are mostly herbaceous plants, although some are trees. There are about 2,000 species, widely distributed throughout the world. Many species are cultivated for their fine flowers, *e.g.*, snapdragon (*Antirrhinum*), *Mimulus, Pentstemon, Digitalis, Calceolaria,* etc. The Paulownia tree of Japan is planted in the S. U. S.

Fiji (fē'jē), formerly FEEJEE, group of islands constituting a British dependency, in the S. Pacific Ocean; number over 200 islands, of which 80 are inhabited; gross area, 7,451 sq. m.; discovered, 1643, by Tasman. The two largest islands are Viti Levu, area, 4,250 sq. m., and Vanua Levu, of 2,600 sq. m.; the others are small. The Fiji Islands are of volcanic origin; earthquakes are common and hurricanes periodical. The moist, hot climate calls forth a most luxuriant vegetation, consisting of breadfruit trees, bananas, coçoanuts, sugar canes, and tea plants; cotton grows wild. The inhabitants are middle sized, strong limbed, short necked, with a complexion between copper color and black. Before the introduction of Christianity by Wesleyan missionaries (1835) they were a fierce race of cannibals. The majority have become Christianized, about 85,700 being adherents of the Wesleyans and more than 10,000 Roman Catholics. In 1861 the king and chiefs of Viti Levu formally offered the island to Great Britain; but it was not until 1874 that the British flag was hoisted. Pop. (1904) 121,770, of whom 94,397 were Fijis and 2,459 Europeans. Suva, in Viti Levu, is the capital.

Fil'ament, in the descriptive botany of flowering plants, the support or stalk of the anther of the stamen; "it is to the anther what the petiole is to the blade of the leaf" (*Gray*). Elsewhere in botany the term has its usual meaning of a thread; thus the filament of a mold is a thread composed of a cell or a row of cells. See FLOWER.

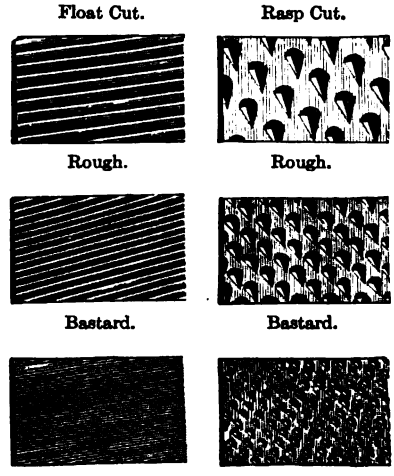
Filangieri (fē-län-jē-ā'rē), **Gaëtano, 1752–88**; Italian publicist; b. Naples; entered the army, 1766; went to the royal court, 1777; became a member of the Supreme Council of the Finances, 1787; is chiefly remembered as author of a treatise on "The Science of Legislation." His son Carlo, 1783–1867, Duke of Taormina, was a soldier under Napoleon, Governor of Sicily under Ferdinand II, and Prime Minister under Francis II of the Two Sicilies.

Fil'bert, nut of the hazel. The name is not often applied to the American wild hazelnuts; and in commerce the round varieties are called cobnuts, the name "filbert" strictly belonging to the elongated sorts, which have also a finer-cut and more beardlike envelope. Filberts are chiefly the product of *Corylus avellana*, the common hazel of Europe and Asia, which is extensively cultivated.

File, tool used in shaping materials of construction. It is a bar of steel, the size and shape of which are determined by its particular use. Its surfaces are covered with sharp cutting edges or teeth, the direction and number of which vary with the nature of the material to be cut and the degree of smoothness which the file is to produce. Where the surface has isolated sharp teeth separated by comparatively wide spaces the file is called a rasp. Rasps are fitted for rapid work on materials of slight resisting power. They are used by workers in wood and leather, and by farriers. The effect of rubbing the file on the surface of the material is to abrade it, cutting from it minute shavings or small particles, and reducing the mass by a gradual process. Files are therefore used only in shaping small pieces or in "finishing" surfaces already of approximately correct figure.

The forms given to files are almost numberless. Those files which have cutting edges extending unbroken from side to side are called "floats" or "single-cut" files. Those which have two sets of such edges, crossing each other at an angle, are called "double-cut." The effect of such crossing of edges is to produce points or teeth, rather than true cutting edges. The coarseness or fineness of the file is known by the trade terms: (1) rough, (2) middle cut, (3) bastard, (4) second cut, (5) smooth, (6) superfine or dead smooth. The most common are the "Sheffield cuts," rough, bastard, and smooth. These are shown in the accompanying sketches.

"Rubbers" for smiths' use are made from blister steel (a coarse sort of the steels made from wrought iron with charcoal), but all other files are made from better grades. Files are forged into shape in a similar manner to all small work in steel, the smith taking care not to work the metal at higher than blood-red heat. Peculiar shapes are produced in dies or formers. Special care is taken to select good fuel for the fires in which the blanks are forged. It is usually coke, made of coal free from any trace of sulphur. The forged blanks are thoroughly annealed, *i.e.*, made less brittle, or toughened, by slow cooling. The finer qualities are annealed or "lighted" in iron boxes, in which they are embedded in sand. Cheaper grades are annealed in ordinary annealing ovens, a less expensive method, but one in which the blanks are less protected against the access of air. The annealed blanks are next ground into the exact shape demanded, and the scale formed during the antecedent



TYPES OF FILES.

process is removed, leaving a clean and properly formed surface for the file cutter to work upon. File making by machinery is an important industry in the U. S., some of the plants producing from 30,000 to 40,000 per day each, and over 3,000 varieties. This is done so cheaply that it no longer pays to recut worn files, as was done when files were made by hand.

File'fish, of the family *Balistidæ* and the order *Plectognathi*. The filefishes have a conical muzzle, terminating in a mouth furnished with teeth in both jaws. In *Balistes* proper their bodies are covered with hard rhomboidal scales, resembling the teeth of a file. The filefishes are brilliantly colored, and abound in warm seas; several species occur on the Atlantic coasts of the U. S.

Fil'ibuster, a buccaneer or pirate. In 1849 and 1851 the name was applied by the Cubans to Narciso Lopez and his fellowers, and from that time it became a common name in the U. S. for the military adventurers who fitted up expeditions against the Spanish-American states. The most famous of the filibusters have been Lopez, above mentioned, and William Walker.

Filicaja (fē-lē-kä'yä), **Vincenzo da, 1642–1707**; Italian poet; b. Florence; was eminent as a jurist, and even consulted as a theologian. He is especially noted for his sonnets, among the most celebrated of which are "La Providenza" and "L'Italia." A translation of the latter was introduced by Byron into the fourth canto of "Childe Harold."

Filicineæ (fĭl-ĭ-sĭn'ē-ē), the true ferns. See FERNS.

Fil'igree, ornamental work in fine gold or silver wire, often made with little metallic beads or grains among the wires. In the production of silver filigree, artistically wrought into bracelets, flowers, and other ornaments, the Genoese stand unrivaled.

Filipe'pi. See BOTTICELLI, SANDRO.

Filipinos (fĭl-ĭ-pē'nōs). See PHILIPPINE ISLANDS.

Fil'lan (Irish FAELAN), name of two saints, of whom the one has his festival, June 20th, and his principal churches at Ballyheyland, Queen's Co., Ireland, and at Loch Earn, Perth, Scotland; while the other has his festival, January 9th, and his principal churches at Cluain Maosena, Westmeath Co., Ireland, and at Strathfillan, Perth, Scotland.

Fill'more, Millard, 1800–74; thirteenth President of the U. S.; b. Sumner Hill (then a part of Locke), Cayuga Co., N. Y.; worked in youth on his father's farm in Sempronius (now Niles), Cayuga Co., and when fifteen apprenticed as a wool carder and cloth dresser. In 1822 he removed to Buffalo, N. Y., was admitted to the bar, 1823, and opened a law office in E. Aurora, N. Y.; commenced practice in the state Supreme Court, 1827, and in 1830 removed to Buffalo. He served in the New York Assembly, 1829–32, and in Congress, 1833–35 and 1837–41, where he was active, favoring J. Q. Adams's views on slavery, and in other public questions acting mainly with the Whigs. He took the leading part in drawing up the tariff of 1842. In 1844 he was the Whig candidate for Governor of New York; was Comptroller of the state, 1847–49. In 1848 he was chosen Vice President of the U. S. on the ticket with Gen. Taylor. On the death of the latter, July 9, 1850, Fillmore became President. The great events of his administration were the passage of the Compromise Acts of 1850 and the Japan expedition of 1852. In 1856 he was the candidate of the American Party for the presidency, but was not elected.

Fil'ter, any apparatus for separating from fluids the foreign substances mechanically intermixed with them. Beds of sand and gravel are natural filters, through which the rainfall percolates to issue in hillsides in springs. Artificial filters are on the same principle, made of some porous material. Filters used by chemists are usually of paper, but felt, cloth, and cotton, woven and unwoven, are often used, also layers of charcoal, sand, asbestos, etc. The Japanese use porous sandstone hollowed into the form of an egg, and set in a frame over a vessel, into which the water drops as it percolates through the stone. The Egyptians adopt the same method for clarifying the water of the Nile. Reservoirs from which cities receive supplies of water commonly have filter beds; but in many large ones no filtering apparatus is used, the water passing from one compartment to another, and the suspended matter falling as sediment.

Finance (fĭ-năns'), the science of monetary affairs; as a branch of economics, the science of public revenue and expenditure. Government expenditure is either *ordinary* (running expenses, easily foreseen) or *extraordinary* (unforeseen expenses or investments of capital whose returns are spread over a series of years). Certain items of ordinary expenditure, such as interest or salaries, may be fixed by legislative act for a series of years; extraordinary expenditure must be determined at each legislative session. Acts for raising and expending public money are usually based on some kind of a *budget*—an official estimate of income and expenses for a fixed period. Public income may be derived from taxation, from business enterprises, from fees or from loans. Taxes are compulsory contributions toward public expenses, assessed in various ways; either *directly*, by levying upon each citizen a percentage of the value of his property or income, estimated by the proper officer; or *indirectly* by internal revenue or customs duties. Government business enterprises in this country include the post office, operated by the Federal Govt., the renting of docks, as in New York City, and the like. In European countries they sometimes comprise telegraphs, railways, lotteries, and various monopolies, such as the manufacture of gunpowder, matches, and tobacco. Fees include coinage and court fees, "benefits" assessed on real property, and so on. Loans are the chief item of revenue relied upon to meet extraordinary expenditure. They may be forced or voluntary. A modern example of the former class is the issue of legal-tender paper money, which creditors of the government are compelled to accept at its face value. In case of a voluntary loan, notes or bonds are issued and sold in the ordinary money market.

Government debt may be *floating* (outstanding warrants or notes issued in anticipation of revenue) or *funded*, consisting of regular interest-bearing bonds. When the proceeds are expended for improvements that return revenue to the public (as the docks in New York) a loan is said to *productive*. When the creditor may claim payment of the face of the bond at a specified time, it is *redeemable*; otherwise, *irredeemable*. In the United States, government loans are usually of the former type; in Europe often of the latter, though the government reserves the privilege of redeeming if it desires. A loan is *secured* when it is a mortgage on some specific government property. A financially strong government generally needs to offer no such security. When the borrowing government is a sovereign, there is no superior power to interpret and enforce its contract with its creditors. Governments have thus repudiated loans, but they pay the penalty when they next desire to borrow. Repudiation of this kind has led to war. It has been held by the U. S. courts that the states of the Union, in their quasi-sovereign capacity, may with impunity repudiate debts, the Constitution forbidding a citizen to sue a state. A public debt may be *converted* (the amount of principal or interest altered) by agreement with creditors. Redeemable loans are usually paid in installments, a certain number of bonds being retired annually. A

sinking fund is sometimes provided by such annual investment as will retire the whole bond issue when it becomes due.

Fin'back, name given to the whales of the subfamily *Balænopterinæ* on account of their prominent dorsal fin. The finbacks include some of the largest of animals, among them *Balænoptera sibbaldius*, which attains a length of 80 ft. On account of the great strength and power of endurance of these whales, coupled with their small yield of oil and the shortness of the baleen (whalebone plates in upper jaw), they are but little sought after.

Finch, name given to many birds of the order *Insessores*, suborder *Oscines*, tribe *Conirostres*, and family *Fringillidæ*, including a numerous series of small and generally brilliant birds, with short, thick, more or less conical bill, without notch at the tip. They include



1. Mountain Finch. 2. Green Finch.

the waxbilled finch of Africa, the Java finch, Java sparrow, padda, or ricebird, of Oriental countries, and the mountain finch and greenfinch of Europe. Among the finches found in America are Lincoln's finch, found from Mexico to Labrador, the sharp-tailed finch, abundant among the salt marshes of S. Carolina, the pinefinch, goldfinch, etc. The American sparrows belong to the genus *Zonotrichia*, and many of these are properly called finches.

The typical finches are found in the genus *Fringilla*, which is distributed all over the world, living in flocks in which are often associated several species; their food consists of seeds, grubs, insects, and grain.

Fin de Siècle (făn dė sē-ā'k'l), French phrase meaning "end of century," and used adjectively in the sense of peculiar to, or characteristic of, the close of the nineteenth century or of the epoch; of such character as might be thought fitting to the end of the epoch—overwrought, overstimulated, artificial, and sophisticated.

Find'ing, the act of finding. The ancient law of treasure-trove was said to apply only to gold and silver purposely hidden in the earth, and of which the owner was unknown. Originally it belonged to the finder; but many centuries ago it was adjudged to belong, to a greater or less extent, to the sovereign. The modern law of finding seems to be this: (1) The finder of lost property is the owner of it against all the world but the original owner, who may reclaim it from the finder at any time, though he may also knowingly leave it unclaimed so long as to waive or abandon his ownership. (2) The finder is always at liberty to leave what he finds untouched, and cannot be made accountable for any injury thereafter happening to it. (3) He may demand from the owner all his expenses necessarily incurred in keeping and preserving the property, and probably advertising and like charges for the owner's benefit. (4) Judge Story has intimated that the finder may also make a further charge for compensation for care and labor, and perhaps for reward. (5) For whatever the finder may lawfully demand of the owner in respect to the property found, it is believed that he has a right to hold it until his demand is satisfied. (6) It seems settled that the place where the property is found has no effect on the rights of the finder. (7) If a reward be offered, specific and certain or capable of being made so by reference to a standard, the finder complying with the terms in which it is advertised becomes entitled to such reward, and may sue for it. (8) The rule that the finder is the owner against all the world except the original owner does not obtain in the case of a chose in action, or mere evidence of debt or claim. (9) A finder may incur punishment as for crime by misconduct about the property he finds.

Find'lay, capital of Hancock Co., Ohio; 90 m. NW. of Columbus; is the seat of Findlay College (Church of God); has foundries, machine shops, edge-tool works, flour mills, carriage, spoke and stave, and rake and handle factories, barrel works, an extensive pottery, brick, and tile works; the center of a natural-gas field; and since 1885 has become a center for glass works, rolling mills, nail factories, etc. Pop. (1900) 17,613.

Fine, pecuniary mulct or penalty imposed by a court on a criminal offender. The precise amount is commonly left to the discretion of the court, though a maximum and minimum sum appropriate to each particular offense is, in general, designated by statute, and the exercise of judicial discretion must be confined within these limits. There is a provision in the U. S. Constitution that "excessive fines shall not be imposed."

Fine Arts, arts which address the sense of beauty or of sublimity or of grace, and are intended to give an exalted pleasure. Thus the fine arts do not serve the daily needs of men in the way of food, etc., but their need of objects of admiration and love, or, in a lower sphere, their need of that which shall charm the eye or the ear. The use of colors in simple combinations, as in stripes and zigzags, is no lofty art, a popular tune is not very refined music, and from such art as these there

results a pleasure which is high only in comparison with sensual pleasures; but a great painting or a great musical composition may give pleasure of a very high and enduring kind, and will give the highest pleasure to the loftiest and most cultivated intelligence. Of all the fine arts music is the purest, because its means of charm are purely art. It tells no definite story, but merely excites and gratifies a sense of beauty through combination and sequence of sounds. Painting and sculpture, when specially directed to beauty of form or color, come next to music in artistry; but both these arts generally have more or less of a purely intellectual appeal to memory or to association.

Neither painting nor sculpture is capable of being separated from the suggestion of natural objects. This is because our powers do not suffice for making fine designs in color or form except by taking the suggestions of external nature. The most perfect combinations of line, of surface, of mass, of dark and light, or of color come as hints from the external world. The plastic and graphic arts, therefore, are less absolutely artistic than music, more complex; less capable, perhaps, of exciting great enthusiasm.

One art which appeals to the eye is almost absolutely pure fine art—namely, gardening in its higher branches. Dancing also, which is not generally classed among the fine arts, is rightly considered capable of becoming a very pure fine art, as sequence of stately or graceful attitudes may address the sense of beauty. It may have been in antiquity a statelier and more beautiful art than we know it, and Eastern dancing to-day points to such a probability. The histrionic art, stage acting, is more distinctly a fine art than is dancing; being more detached from the everyday personality of the actor, and in expression analogous to certain branches of painting and sculpture.

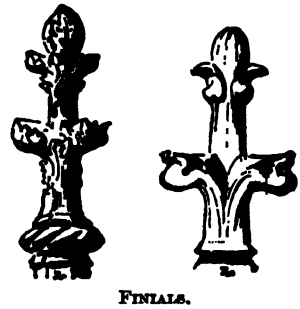
The fine arts are commonly said to be painting, sculpture, and architecture, excluding music, poetry, eloquence, and the dance; but if we in this way use the term "fine art" or "the fine arts" for the arts of color and form alone, there are really but two—the art of molding and carving form, and the art of representing solids on a surface by means of form, light, and shade and color. Architecture is not a separate or detached art, as painting or sculpture is, but a means of making buildings appeal to the sense of beauty through their form. The process of making a silver cup or a sword or a rug or a book cover beautiful makes as distinct an appeal to the sense of beauty as that of making a building beautiful; and fine art may be cultivated equally in the practice of such industrial arts. Of these, architecture is the highest, as it is the basis of the finest applications of decorative art. See ARCHITECTURE; DECORATIVE ART; PAINTING, etc.

Fin'gal, or **Fi'onn,** hero of Gaelic legend; the father of Ossian, the heroic poet of the Gael. See MACPHERSON, JAMES.

Fin'gal's Cave, cavern on the island of Staffa, off the W. coast of Scotland, hollowed out in a mass of volcanic rocks. Two ranges of basaltic rocks are supported upon a lavalike mass beneath, and the unequal hardness of the materials, combined with the perfection of the columnar structure, has permitted the carving out, by the waves, of one of the most picturesque pieces of natural architecture in the world. The entrance is 42 ft. wide, and 66 ft. high; the length of the cave, 227 ft. The beds of basalt on the coast of Antrim, Ireland, probably were but a part of the same great outpouring of lava.

Fin'ger. See HAND.

Fin'ial, terminal ornament of a pinnacle, spire, or gable; also sometimes of a pointed arch. In the Middle Ages finials were important elements of architecture, owing to the abundant use of buttresses, spires, pinnacles, turrets, and steep gables, and were modeled with masterly skill in designs generally suggested by the vegetable world. They were usually carved in stone, but leaden finials of great beauty were used on the wooden spires of churches and to terminate the ridge crestings of hipped roofs. Classic architecture made occasional use of roof ornaments similar to finials, the most famous examples being the florid marble *acroterium* on the summit of the choragic monument of Lysicrates at Athens.



FINIALS.

Finiguerra (fē-nē-gwĕr'rä), **Tommaso,** or **Maso,** 1424–75; Italian niello worker and goldsmith; b. Florence. To him is attributed the discovery of the art of taking prints on paper from metallic plates.

Finisterre (fĭn-ĭs-târ'), **Cape,** promontory at the NW. extremity of Spain.

Finisterre Moun'tains, central of the three ranges of high mountains, the Coast, Finisterre, and Bismarck chains, parallel with one another and the coast in German New Guinea. Of the highest peaks, Kant rises 11,400, and Schopenhauer to 11,000 ft. The range was explored in 1888 by Zöller, who saw the still higher Bismarck range about 50 m. farther inland; of this latter, the highest point is Mount Wilhelm, about 16,000 ft.

Finite (fī'nīt) **Dif'ference,** in mathematics, the difference between two values of a variable quantity; generally the amount by which the quantity increases in consequence of an increase of the unit in the variable on which it depends.

Fin'land, grand duchy of Russia; bounded by Norway, Sweden, and the gulfs of Bothnia and Finland; includes a portion of Russian Lapland; area, 144,255 sq. m., one third occupied by lakes and marshes. The surface is a tableland from 400 to 600 ft. high, with occasional elevations, depressions, and ranges of hills covered with dense forests. The coast is low, except the S. part, where rugged cliffs skirt rocky islands. The chief industry is cattle breeding. Formerly Finland exported much rye and barley, and was called "the granary of Sweden," but these exports have given place to products of the forest, such as timber, pitch, potash, tar, and rosin. Finland yields also some copper, iron, lime, and slate. The climate is rigorous. About eighty-four per cent of the population are Finns, the balance being Lapps, Swedes, Russians, Germans, and gypsies. The Finns, who call themselves Suomi, are a branch of the Ugrian race, kindred to the Laplanders and to the Magyars of Hungary. They are honest, industrious, and energetic.

In olden times the Finns formed an independent empire. In the twelfth century they were conquered and converted to Christianity by the Swedes, and Swedish was the official language down to 1863. Finland has produced a long list of brilliant scholars, poets, and artists. Her great national poem is the "Kalevala," an epic, embracing ancient folk songs and poems. In no country is there less illiteracy, all the natives being able to read and write. To purchase peace with Russia, Sweden ceded to that country all Finland by the Treaty of Fredrikshamn, 1809. From 1809 to 1863 the Diet, or Parliament, was not convoked by the Russian Govt. Since the conquest there has been developed a political and literary movement known as *Fennomania*, an effort to establish Finnish as the language of the land. The most important towns are Helsingfors, Abo, Sveaborg, and Viborg. The state church is Lutheran. The government is nearly independent of the rest of the Russian Empire, and is administered in accordance with the Finnish constitution of 1772, reformed in 1789, modified in 1869 and 1882, and again reformed in 1906. The national Parliament now consists of one chamber of 200 members chosen by direct and proportional election. The suffrage is possessed, with usual limitations, by every Finnish citizen (man or woman), twenty-four years of age, and there are a number of women who sit in the Parliament. The country has an independent system of coinage, the unit being the mark (twenty cents). Pop. (1904) 2,780,700.

Finland, Gulf of, great E. arm of the Baltic. Its water is only slightly salt, having come from the great lakes, Onega, Ladoga, Peipus, and Saima, through the river Neva. At its E. end is St. Petersburg, and along its coasts are Narva, Reval, Frederikshamn, Helsingfors, and Viborg.

Finsteraarhorn (fĭn-stĕr-är'hörn), highest peak of the Bernese Alps, Switzerland, 14,026 ft.

Fiord (fyörd), narrow and deep arm of the sea, penetrating a mountainous coast. Fiords characterize the coasts of Norway, Scotland, Greenland, Labrador, British Columbia and S. Alaska, S. Chile, and S. New Zealand, and to a less degree the coasts of Maine, Nova Scotia, etc. They are produced by the submergence of valleys, excavated by atmospheric weathering during a former higher stand of the land, and frequently more or less modified afterwards by glacial action.

Fiorelli (fē-ō-rĕl'ē), **Giuseppe,** 1823–96; Italian archæologist; b. Naples; won early fame as a director of the Pompeian explorations, but was displaced for his liberalism. After Victor Emmanuel had taken S. Italy, Fiorelli was made (1860) chief director of the operations at Pompeii, and later chief director of the excavations of the whole kingdom; also Prof. of Archæology, Univ. of Naples. In 1865 he was elected Senator. He edited the *Giornale dei Scavi*, and published maps and reports of his work.

Fir, popular name for all coniferous trees of the genera *Abies* and *Picea* (in Great Britain even the native pine is incorrectly called Scotch *fir*); but there is a tendency to restrict the name to the group represented by the silver fir of Europe, the balsam firs of Atlantic N. America, and the noble *Abies grandis*, *A. amabilis*, and *A. nobilis* of Oregon and California; *i.e.*, to those species which bear lateral and



Balsam Fir.

erect cones, the scales of which at maturity fall away with the seeds. Most of these yield fir balsam. The numerous species of the other main division properly take the name of *spruce*. These are known by their cones hanging from the tips of branches and their scales remaining permanently attached to the axis. There is a peculiar group of spruces or spruce firs represented in the N. Atlantic U. S. by the hemlock spruce, and in and W. of the Rocky Mountains by the noble Douglas spruce. Fir timber generally is light, soft, and white; that of some species is excellent for masts and spars, but not otherwise of high value. That of the spruce is more valuable than that of the proper firs, excepting the European silver fir. See Conifer; Pine.

Firdusi (fēr-dō'sē), or **Firdausi, Abul Kasim Mansour,** abt. 940–1020 A.D.; Persian poet; b. near Tus, Khorassan. Late in life he went to the court of Mahmoud of Ghuzni, where he was encouraged by the sultan to compose his great historical poem, "Shah Nameh" ("Book of Kings"). He spent thirty years on this work, which contains 60,000 verses, relating the mythical and romantic exploits of the Persian kings from the foundation of the world to the invasion of the Mussulmans abt. 636 A.D. Its most interesting portion is the account of the prowess of the hero Rustem. It is one of the oldest poetic monuments of Persian literature.

Fire. See COMBUSTION; HEAT.

Fire Alarm', device used for giving notice of the occurrence of a fire; classified as fire alarm telegraphs, automatic electric fire detectors, and mechanical fire detectors. In the first named a system of signal boxes is distributed over a district, and connects by electric circuits with a central station, and thence with a series of alarm bells on a second circuit. By giving a signal at one of the boxes the place of the fire is telegraphed to the central station, and from the latter to the signal bells at the local stations, to direct the engines to the place where needed. The first practical trial of a fire alarm telegraph system was made in 1851 in Berlin and New York, but the plan was much modified in succeeding years, and as thus changed was fully adopted in some of the cities of the E. states before being put into regular use in New York in 1871. Although simple in principle, the details of the system are complex.

Different substances or mechanical devices change their volume or position with change of temperature; and if we imagine one of these substituted in lieu of human fingers to break or close, by such changes, an electric circuit connected with alarm mechanism, we have an idea of the essential principle of a self-acting electric fire detector. Mechanical detectors depend for their action upon agencies altogether mechanical; such, for example, as the burning of a string to set the annunciating appliances in motion.

In the automatic electric fire alarms a thermostat, acting, when heated, by change of form or position, is used to break or close a circuit. In the earliest form the mercurial column of a thermometer closed the circuit when the temperature is high enough to be dangerous. A galvanometer, alarm-bell apparatus, and electro-magnetic coil are included in the circuit. Thermometers properly fitted with wires are placed in important parts of the building, so that any unusual increase of temperature becomes instantly known. On the completion of the circuit a soft iron bar, detached from a permanent magnet, falls upon the detent of a spring or other alarm, putting it into action, and at the same time deflects the galvanometer needle, so as to show the place of the danger.

The importance of automatic fire alarm apparatus is but beginning to be adequately appreciated. Contrivances operating on similar principles are capable of being successfully applied to many other purposes; as, for example, the detection of "heating" in grain bins, and for the maintenance of desired temperature in various industrial operations.

Fire'arms. See SMALL ARMS.

Fire Clay, beds of clay underlying most of the coal seams. These clay beds are fine sediment which accumulated at the bottom of shallow pools of water, later filled up by growing vegetation. The roots of water plants penetrating this clay have generally abstracted its potash, soda, lime, iron, etc., and have removed such a percentage of silica as to leave it with a larger relative quantity of alumina than it had before being subjected to their action. Thus they have taken from it its more fusible ingredients, and have imparted to it the peculiar property of remaining unchanged at a high heat. Clays very like fire clay are found underlying many beds of peat, and there the formation of fire clay may be seen going on. In the U. S. there are two varieties of fire clay —the one nonplastic, and specially adapted for fire brick; the other plastic, and used also for fire brick, and for pottery, glass pots, etc.

Fire'crackers, toy fireworks very popular in the U. S. in celebrating the Fourth of July. They consist of paper tightly rolled round some explosive, with a fuse at one end. They vary in diameter from a fraction of an inch to three or four inches in diameter. Until a few years ago they were imported chiefly from China, where they have been made for centuries, and were known as Chinese firecrackers. Many accidents and deaths are caused by the careless handling of lighted firecrackers, cases of tetanus or lockjaw often arising from the dirt introduced into the wound made by an exploding cracker. Such wound, even when apparently slight, should be very carefully cleansed with an antiseptic wash and dressed by a surgeon. The explosive used in these crackers is usually a mixture of chlorate and bichromate of potash with a little charcoal. See PYROTECHNY.

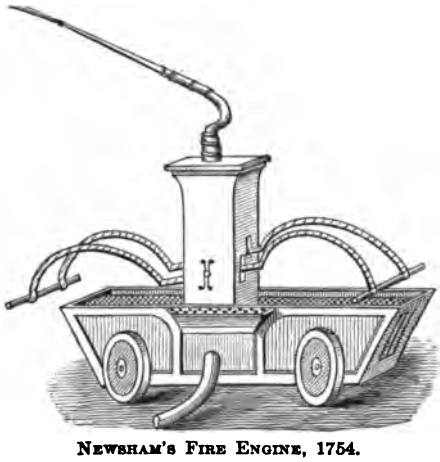
Fire Damp. See MARSH GAS.

Fire Eat'er, a term the invention of which is ascribed to Col. Howell Rose, of Coosa Co., Ala., who in the Southern Rights Convention at Montgomery, Ala., 1851, applied this epithet to the avowed Disunionists of that body. The term was afterwards applied in political parlance to extremists among the Southern Rights men, whether Disunionists or not.

Fire En'gine, machine for throwing a stream of water to extinguish fires. At Augsburg, Bavaria, fire engines were in use 1518. Leathern hose was invented abt. 1670 in Amsterdam by two Dutchmen named Van der Heyde, who also invented the suction pipe. At the close of the sixteenth century the only engines known in England were "hand squirts," syringes of brass holding two or three quarts of water. Modern hand engines consist essentially of two vertical double-acting force pumps, one under each end of a lever beam (or sometimes four single-acting pumps), to which are attached long brakes to be worked by men. The pumps discharge into one reservoir, the upper part

of which contains air to serve as a spring for equalizing the pressure during the piston stroke and the interval between strokes. A suction pipe from the lower end of the force pump is always ready; but is not required where a stream of water with sufficient head, as from the aqueduct hydrants, can be introduced.

The application of steam power to fire engines was first attempted by Mr. Brathwaite, in London, 1830. His first engine was of barely six-horse power, weighing a little over 5,000 lbs., had an upright boiler, in which



NEWSHAM'S FIRE ENGINE, 1754.

steam was generated to a moderate working pressure in twenty minutes, and was capable of forcing about 150 gallons of water per minute from 80 to 90 ft. high. The city of Cincinnati gave the first demonstration of the feasibility of this application of steam. Steam fire engines are usually drawn by horses, but automobile or self-propelling ones have been introduced in several large American cities, and in 1891 a patent was issued for an engine in which electricity was the motive power both for the propulsion of the engine and the discharge of water. Hanover, Germany, was the first city to install a complete service of automobile fire engines, consisting of engines, hose carts, and hook and ladder trucks; after five years' use the service was pronounced entirely satisfactory (1907).

Floating steam fire engines were proposed by an English writer, 1834, and in 1850 a pump was placed on a propeller and geared with the engine. It threw 600 gallons per minute to a height greater than any of the buildings on the E. India Docks, London. The water tower consists of a sectional pipe attached to a heavy truck and extensible to a height from which water fed to it by an engine can be thrown into the highest windows of the modern "skyscraper." The introduction of fire boats, which now form an important part of the regular fire department of all large cities having extensive water front, was the first step toward independent high-pressure service. The next step was the substituting for fire engines of central high-power pumping plants or storage reservoirs, by means of which an enormous amount of water can be drawn from the several mains of the high-pressure system and concentrated at high pressure upon a single block directly from the hydrant.

Fire Escape', device to facilitate the escape of persons from burning buildings. The common fire escape is a system of fixed iron ladders attached outside beneath the windows, ordinarily with a platform or balcony provided for each story. Scores of complex machines intended for use as fire escapes have been projected, but firemen still use sectional ladders, which they manipulate at great disadvantage by hand. These were in use previous to 385 A.D., as also were flexible ladders with hooks at the ends, which were thrown to catch upon walls and window sills. In ancient use, too, were telescopic tubes raised vertically from a base frame by a screw, and carrying a basket large enough to hold several persons; also lazy tongs, or jointed superposed bars lifting a platform. Both of these principles are embraced in numerous fire-escape apparatus projected in recent times.

Fire Extin'guisher, apparatus for extinguishing fires either by means of water or by non-combustible gases. The term technically considered excludes fire engines, although the principle of operation may be similar in both. The original fire extinguisher, as the term is now used and understood, was the invention of William A. Graham, of Lexington, Va., who filed his application for a patent, November, 1837. The patent was issued more than forty years later, July, 1878, and its validity was sustained in a Federal decision in 1884. Graham died in 1857 after twenty years of vain endeavor to convince the Patent Office of the patentability of his invention. Twelve years later certain foreign inventors received a U. S. patent embracing its principle, but were unable to carry back the date of their discovery of it beyond 1861, whereas it was shown that Graham, aside from his application filed in 1837, had successfully made and used an apparatus embodying the discovery as early as 1853. In 1876 the administrators of Graham filed a new application, which was rejected on the ground of delay and long public use. On June 14, 1878, an act of Congress was passed which revised the application of forty-one years before, and on this the patent was finally issued.

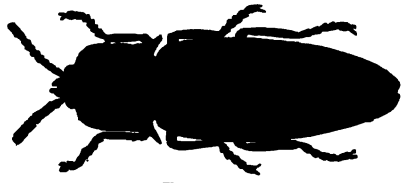
Graham's original apparatus was improved by later inventors till the present self-acting extinguisher was evolved. There are several types, of which the Babcock is probably in most general use. This is in two forms: a small metallic cylinder, which can be carried on one's back, and a larger one or pair, mounted on wheels. Specimens of the latter type, popularly called chemical engines, are used in the U. S. by the salvage corps maintained by insurance companies. In each form the cylinder contains, in its upper section, a glass or lead vessel holding sulphuric acid. The rest of the cylinder is filled with water holding in solution bicarbonate of soda. The stopper of the small vessel is worked by a

rod through the top of the extinguisher. By withdrawing the stopper the vessel tilts over, and mingles the acid with the solution, thereby discharging carbonic acid from the latter, and the opening of a stopcock, near the bottom of the cylinder, lets the water rush out through a hose.

Other forms of extinguisher devised for quenching fires at their start are glass hand-grenades to be thrown into a flame and broken as they strike, and a variety of metallic tubes operated in different ways, the apparatus in each case containing a substance that will develop gas enough to put out a small fire by excluding air. These small devices are made for use in dwellings, offices, factories, places of amusement, steamboats, railroad cars, etc.

Numerous methods have been proposed for insuring the automatic action of fire-extinguishing apparatus through the inevitable increase of temperature. Pipes extending from a central reservoir of water or extinguishing gases, and provided with fusible plugs or actuated by a thermostat, have been largely and successfully introduced.

Fire'fly, popular name of insect which is luminous at night. Fireflies are beetles of the families *Lampyridæ* and *Elateridæ*, the former including the glowworms. The luminous organs of fireflies and glowworms are composed of yellow masses of cells filled with granular matter and traversed by many tracheæ (breathing tubes). It is now generally held that the light is produced by the slow combustion of



FIRE-FLY.

granular and perhaps fatty matter, oxygen being abundantly supplied by the tracheæ. It is not thought that phosphorus is present in any noteworthy amount in the luminous matter. Spectroscopic examination of the light of insects of both families gives a beautiful continuous spectrum without lines. The fireflies of Central and S. America are chiefly *Elateridæ*, of the genus *Pyrophorus*. They generally give a very intense light, which comes from two spots on the prothorax. The U. S. have some *Elateridæ* with luminous larvæ. Our common "lightning bugs" are of numerous species, all *Lampyridæ*, and mostly of the genera *Photinus* and *Photuris*. *Photuris Pennsylvanica* is the most common. See GLOWWORM.

Fire'hole Riv'er, in Wyoming; main fork of Madison River; flows from Madison Lake, a sheet of water of some sixty acres area, NW. through the Firehole Basin, one of the most remarkable geyser regions of the Yellowstone National Park.

Fire Insur'ance. See INSURANCE.

Fire'proofing, the process or means of rendering textile fabrics or other materials incombustible. Impregnation either with alum, borax, or copperas is by far the best treatment for fireproofing and preserving wood, and is strongly recommended for railway cars subjected to risk of fire from overturned stoves and lamps in cases of collision, etc. The use of sodium tungstate and ammonium phosphate has been found to be best adapted for common use with cloths, etc., either of these rendering the lightest muslins uninflammable. The sodium tungstate has the advantage that it may be used with starch and does not interfere with ironing, and should be used in preference for light articles of apparel, curtains, upholstery, etc. The disastrous results of fires in places of amusement have led to the use of fireproof drop curtains, and asbestos is the material most relied upon for the desired fire-resisting properties in such places.

FIREPROOF BUILDING is the science of constructing an edifice not only incombustible, but capable of resisting, without injury to its stability or serious damage to its structure, the action of any fire originating either within its contents or from without. The destructive effect of long-continued and fierce flame upon incombustible materials, such as stone and iron, renders the problem of fireproof building a difficult one. The burning of stored merchandise, and even the radiated heat of a great conflagration, may suffice to melt exposed iron-work, or at least to soften it until it collapses, dragging floors and walls down with it in a general ruin; it may fuse the surface of wall tiling, crack and destroy solid granite masonry, and cause zinc and copper to burst into flame.

The distinction should be carefully drawn between fireproof and merely incombustible buildings. The latter, although wholly composed of material incapable of combustion, may be completely gutted by the spread of the fire among their contents from one part to another through stairways and other openings; and may even suffer serious structural damage by the collapse of their metal beams and columns. A fireproof building should suffer no structural damage from either internal or external fire, and should offer an effectual barrier to the spread of the flames from one story or section to another. There is also a third class of buildings which, though built with incombustible walls, floors, roofs, and partitions, are finished with inflammable fittings and decorations. The damage by fire to "fireproof" buildings has mainly been in structures of this class, which includes a large proportion of modern "fireproof" hotels, apartment houses, and office buildings.

It should be the aim in any system of fire-resisting construction (1) to build wholly of incombustible materials; (2) to protect by nonconducting coverings all exposed structural metal work; (3) to dispense absolutely, if possible, with inflammable material even for the finishing and minor embellishments; and (4) to oppose every possible barrier to the passage of fire from one part of the building to another.

FIREPROOF SAFES are movable receptacles of iron or steel, lined with noncombustible mate-

rials, and used for the preservation of papers, money, or other articles of value. The essential features in the construction of fireproof safes are included in the following classification: (1) those having a filling of some simply nonconducting material, like clay or concrete; (2) those fitted with plaster capable of giving off water by calcination, though only in moderate quantities; (3) those in which alum or other salt yielding a large percentage of water by decomposition, is mingled with the plaster; and (4) the steam safes, in which vessels either of glass or metal and filled with water are arranged between the inner and outer walls to give off steam when subjected to a high heat. It must be remembered that no safe is absolutely fireproof, although they are made capable of withstanding an exceedingly high temperature. Wherever possible, a safe should be imbedded in brickwork, which is one of the most effective of all protections against the injurious transmission of heat.

Fire Ship, formerly a vessel, often old and unseaworthy, laden with combustibles, fired, and sent into the midst of an enemy's fleet to set it afire. This ancient device has been frequently tried in modern warfare, but, though sometimes of service, can never be of much effect against modern war ships.

Fire'works. See FIRE-CRACKERS; PYROTECHNY.

Fire Wor'shipers. See GUEBERS; PARSEES.

Firishta (fē-rēsh'tä). See FERISHTAH.

Fir'man, in Oriental countries, the certificate or written mandate of a sovereign or government; is especially applied to passports issued to travelers in Turkish countries.

First Aid to the In'jured, a term applied to the first and essential things done for the immediate relief of the injured and distressed. Remedial measures for the most common emergencies may be found under the following titles: ANTIDOTE, ARTERY, BANDAGES, BURNS AND SCALDS, DROWNING, FAINTING, POISON, SUNSTROKE, AND WOUNDS.

First'born, among the Hebrews, the first child of the father and the mother; hence he is spoken of in regard to the father as "the beginning of his strength," and in regard to the mother as "the opening of the womb." Before the establishment of the Hebrew theocracy the rights of primogeniture (first birth) were recognized, but they were sometimes transferred from the eldest to a younger son, as from Esau to Jacob. After the Mosaic economy was established, such a transfer was forbidden (Deut. xxi, 15–17). The birthright consisted in a double portion of the inheritance. To commemorate the destruction of the first-born of the Egyptians, God required that the first-born males of the Hebrews should be consecrated to him; also the firstlings of their cattle and the first fruits of their ground.

The right of government inhered in the eldest son in the absence of the father, or in the case of his death while the family remained together. This preëminence attached to the eldest son in the royal family, as he succeeded to the throne (II Chron. xxi, 3). The first-born son seems to have had authority over the rest of the family from the earliest times; but this appears to be distinguished from the peculiar birthright prerogative, for Esau says of Jacob, "Is he not rightly named Jacob (a supplanter)? for he hath supplanted me these two times: he took away my birthright, and, behold, now he hath taken away my blessing" (Gen. xxvii, 36). As the first born was considered more vigorous than younger children, having been begotten and brought forth before the parents had lost their strength, and first developing into manhood, he was invested with superior prerogatives in the family. This has been the case among almost all people. Hence the destruction of the firstborn of Egypt was considered so great a calamity.

In the Scriptures, the term "firstborn" is used metaphorically for the first, or chief, or preëminent. God said of David (Ps. lxxxix, 27), "I will make him my firstborn, higher than the kings of the earth," where the second clause explains the first. Christ is "first-born among many brethren" (Rom. viii, 29), as he is "the Son of God" in a peculiar sense—preëminent among the sons of God. The righteous are spoken of as "a society of first-borns, registered in heaven" (Heb. xii, 23). For the subject of the firstborn's rights under the English law of primogeniture, see PRIMOGENITURE.

First Fruits, the earliest gathered fruits of the season. The offering of the first fruits, with religious ceremony, in acknowledgment of Divine bounty, was practiced by the Egyptians, Greeks, and Romans, as well as by the Hebrews. Under the Mosaic ritual these offerings were of two kinds—national and individual. The national offerings were in connection with two of the great festivals; the first, a sheaf of barley at the Passover, when the barley harvest began; the second, two loaves of bread at Pentecost, when the wheat harvest ended. These national offerings, of solemn representative character, were to be made at Jerusalem, and ceased with the destruction of the Temple. Individual offerings were also for the sustenance of the priesthood, and were made throughout the country, as well as at Jerusalem. Some offerings were expressly devoted to the priests' use (Num. xviii, 12), as the best of the oil, wine, and wheat, and the fleece of sheep. Of young trees no fruits could be taken till the fourth year, when they were offered as first fruits; after this they might be eaten. Of all ripened produce of the earth, a basketful was to be presented by each Israelite. The gift was not to be taken from the portion designed for tithes, nor from the corners left for the poor. One fortieth was accounted a liberal proportion of the produce, while a moderate portion was a fiftieth, and a scanty portion a sixtieth; but whatever was offered must be the produce of the Holy Land. Beyond Palestine it might be converted into money, and thus sent to the Temple.

Fir' Wool, fiber prepared to some extent in Germany from the leaves of the Scotch fir, and made into cloth and wadding, used in the

treatment of rheumatism and skin diseases. Fir-wool oil is an oil of turpentine made from



Scotch Fir.

these leaves. Fir-wool extract is a residual substance prepared from the leaves, and used in medicine.

Fisc, originally a wicker basket in which money was carried and kept. When the empire was established the name *fiscus* was given to the treasure which belonged to the emperor as such. Under the later emperors no separate state treasury existed. In the civil law of modern Europe the fisc is the property of the state. The word confiscation, derived from *fiscus*, signifies the forfeiture of any species of property to the state.

Fischart (fĭsh'ärt), **Johann,** abt. 1550–90; German satirical writer; b. Mainz, Hesse; became advocate to the Imperial Chamber at Spires in 1581; in 1583, Bailiff of Forbach, where he died. His works, in the main, were written to condemn the vices and follies of all classes, and to vindicate Protestantism. Perhaps the best known is a free imitation of Rabelais's "Gargantua." Among other works are "The Jester in Rhyme," a satire against the Dominicans and Franciscans; "The Fortunate Ship," a narrative poem; "The Flea Hunt," a comic poem; "The Four-cornered Hat," against the Jesuits; "The Grandmother of all Prognostication," and "The Hive of the Holy Roman Swarm," a sharp attack on the dissolute clergy.

Fish, name popularly applied to vertebrated animals living in the water, breathing by means of gills and possessing paired fins. All fish-like vertebrates are divided into three classes: (1) lancelets (*Leptocardii*), small marine animals representing the lowest degree of development of the vertebrate type, possessing no distinct head and with a soft cartilaginous cord which serves as a vertebral column; (2) lampreys and hagfishes (*Marsipobranchii*), naked, eel-shaped animals with imperfectly developed skulls, no true jaws and a cartilaginous skeleton; (3) fishes (*Pisces*), including sharks, rays, sturgeons, garpikes, and bony fishes, possessing a well-developed skull, with a movable lower jaw, developed brain, and a cartilaginous or bony skeleton. Of this last class, the bony or true fishes (*Teleostomi*) constitute the commonly known varieties of both fresh-water and marine fishes.

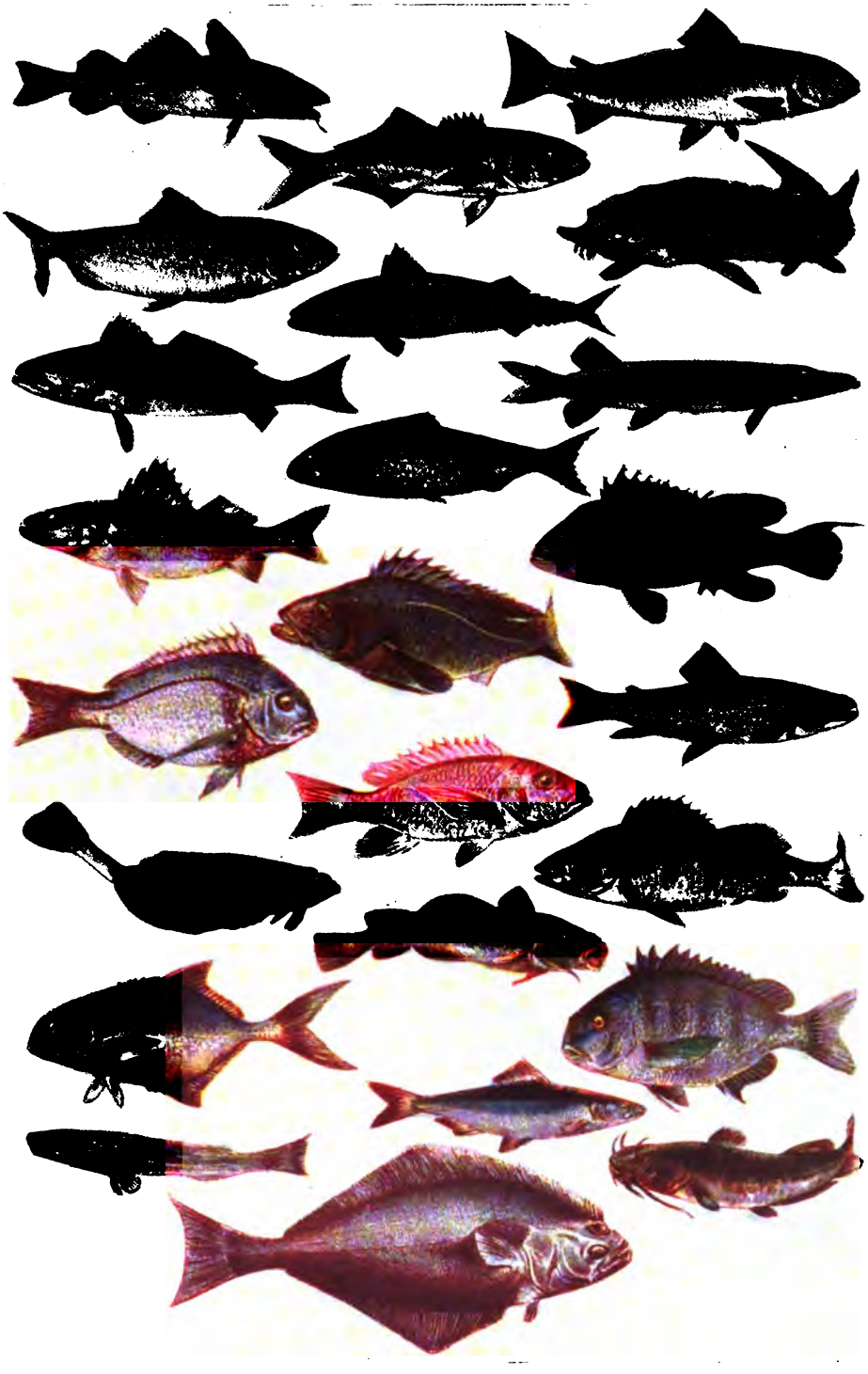
Nearly all representatives of the class *Pisces* are covered with scales or bony plates. The skin of the sharks generally contains minute, platelike scales which are rasping to the touch, while that of the sturgeons and garpikes is characterized by prominent bony bucklers or hard, enamel-covered angular and rhomboidal scales. Other forms of scales are the cycloid and ctenoid: cycloid scales have their margins entire; ctenoid, serrated.

The skeleton of the common types consists of the skull, a series of vertebræ, generally biconcave, and the pectoral and pelvic girdles. The number of vertebræ is not constant, and often attains a high number, especially in the shark family. The pectoral girdle is a fork-shaped apparatus like a bird's wishbone, curved forward, connected with each side below at the median line, and joined to the skull by intervening bones. To the pectoral and pelvic girdles are attached the pectoral and ventral fins respectively. The dorsal, anal, and caudal fins are connected with the vertebral column by means of their supporting rays, which in turn connect with a system of supporting bones called interspinal bones, which stand in definite relation to the bones of the vertebral column, although not directly joined to it. The fish is propelled through the water mainly by the lateral movement of the caudal or tail fin, the other fins maintaining the direction. The skull of higher fishes is a complicated structure; in sharks and rays it is a simple cartilaginous box. To the lower part of the skull are attached the lower jaw, hyoid, and gill arches. The hindermost of the gill arches are generally modified into pharyngeal bones.

The respiratory system of all fishes consists of gills attached to the gill arches in front of the scapular arch. Oxygen is thus obtained by the blood from water passing through the mouth, into the pharynx, and escaping through the gill clefts. The tongue is attached to the hyoid apparatus, and often bears teeth. In some classes and groups, teeth may be borne on any bones in the circumference of the mouth in addition to the jawbones. There may also be no teeth at all.

The more important differences in the digestive system of fishes as compared to other vertebrated animals lies in the possession of cæcal appendages at the anterior end of the intestine, which act as supplementary stom-

NORTH AMERICAN FOOD FISHES.



Codfish
Shad
Weakfish
Striped Bass
Porgy
Flounder
Pompano
Whitebait

Bluefish
Mackerel
Herring
Blackfish
Red Snapper
Tomcod
Sardine
Halibut

Salmon
Sturgeon
Pickerel
Sea Bass
Brook Trout
Yellow Perch
Sheepshead
Catfish

achs; the relatively short intestine, and, excepting in the teleosts, the presence of a "spiral valve" to increase the area of absorption. The liver, gall bladder, and pancreas are fairly well developed. In the blood system the heart consists of a ventricle and auricle, and a thickened part of the large artery, known as the *bulbus arteriosis*. The blood does not return to the heart after being purified, but is distributed from the gills to the main artery, and thence to the different parts of the body. Its flow is therefore relatively sluggish, which fact causes its temperature to approximate that of the environment. Fish are therefore cold-blooded animals like the reptilia and amphibia. The nervous system includes the brain, spinal cord, and the sympathetic system, with variations peculiar to the respective classes. Between the intestines and the backbone are located the air or swim bladder and the kidneys, the latter appearing as dark-red lobulated organs, and occupying nearly the entire length of the abdominal cavity. The air bladder has some value in maintaining the equilibrium of the fish.

The sexes of fishes are separate, and in the majority of types the eggs are laid in gravel or sand, where they are fertilized by a discharge of the sperm cells, or milt of the male. Certain representatives of the sharks bring forth their young alive. The number of eggs varies with the nature of the species—some forms, like the cod, bearing millions. Departures from the usual globoid form of egg are represented by the well-known purse-shaped, leathery cases containing embryos of sharks and rays. The usual season for spawning occurs in the spring, though colder months are selected by the salmon and trout. Of the migratory fishes, those ascending fresh-water streams to spawn, as the salmon, shad, and alewife, are termed "anadromous" forms, those descending to the sea, as the eel, "catadromous." The nest-building instinct is strongly developed in many forms of both fresh and salt-water fishes, the usual type of nest consisting of a shallow basin with pebbly bottom made and kept clean by the fins of the parent fishes. The sticklebacks construct a nest of sticks and grass cemented together by a sticky secretion. Certain forms of catfishes (*Siluridæ*) bear the eggs in the mouth during the period of incubation, while the sea horse (*Hippocampus*) protects its eggs and young in a ventral pouch.

Certain forms of fishes are vegetarians; the majority, however, are carnivorous, feeding upon forms smaller than themselves or upon the minute crustaceans of the waters. Distinct fish fauna are characteristic in accordance with the geographical position and the depth of water, the greatest variety of fishes being found in tropical waters. Certain forms are confined to limited sections, while others, like the mackerel family (*Scombridæ*), are of a cosmopolitan character, and found in all sections of the globe. The deep-sea fishes, as well as those forms isolated in caves and mountain waters, are peculiarly fitted to their environments. At present date there are over 9,000 species of living fishes known.

Fish Cul'ture, a term which in its widest sense means the increase, distribution, and protection of useful and ornamental aquatic animals and plants. Modern fish culture includes artificial as well as natural propagation and rearing of useful and ornamental water animals, and the acclimatization of species in waters to which they are not native. The necessity of artificial propagation has become most manifest in interior waters where fishing operations and artificial obstructions have interfered with natural reproduction. Artificial propagation affords many advantages over natural conditions. Under natural conditions only a small percentage of the eggs cast by the female are impregnated, but by the artificial method nearly all the eggs can be impregnated and hatched. In a state of nature eggs are devoured by insects, fishes, birds, mammals, and other enemies; they are destroyed by freshets or crushed by logs, and the young fish escaping these dangers are attacked incessantly by hosts of predatory animals. In a hatchery or pond station both eggs and young are protected almost entirely from all these destructive agencies, the growing fish are assorted according to size, and are regularly and properly fed. The larvæ of gnats, mosquitoes, flies, and various small crustaceans are employed as food at different stages of the growth of the young, and the flesh of domestic animals constitutes the principal food of older fish. Upon the character of the egg depends the manner of handling during incubation. Some are spread on wire trays in boxes through which water flows, some are hatched in glass jars, and others are collected on grass roots and twigs, to which they adhere during the incubation period. Fish eggs are usually shipped between layers of damp moss or cotton, or on flannel or zinc bottom trays lined with moss. The temperature of the inside of the shipping box is kept low by means of ice.

Public fish culture dates from 1850, when France established at Huningue the first fish hatchery under government direction. In the U. S., Massachusetts appointed the first State Fish Commission, but New Hampshire, in 1865, first began public fish culture by importing and hatching salmon eggs from Canada. The first public fish hatchery erected in the U. S. was the shad station of Massachusetts at Hadley Falls on the Connecticut River. At the present time forty states and territories have fish commissions in more or less active operation, with annual appropriations ranging from $1,500 to $34,000, and the aggregate annual appropriation nearly $250,000. The U. S. Fish Commission was established by Congress in 1871, and began the artificial propagation of fish in 1872. The commission has stations in operation in thirty-one states and territories. The appropriations for the fiscal year ending June 30, 1900, aggregated $446,500.

Among the many results accomplished by fish culture may be mentioned the introduction of European salmon and trout into New Zealand and Australia; the successful transfer of trout from the U. S. to Japan, Great Britain, and the continent of Europe; the acclimation of the black bass in Great Britain and

Germany; the introduction of several species of European trout into the U. S.; the transfer of shad and striped bass from E. rivers to California; and the remarkable increase in the catch of shad in the E. U. S. since 1880. The number of shad taken in 1890 was nearly two and a half times as great as in 1880, and the increase in the yield was worth $823,965, notwithstanding that the average price per pound in 1890 was only eleven cents as against nineteen cents in 1880. The number of species of fish to which the methods of fish culture are now applied by the general government and the states is not far from forty. The shad, whitefish, pike, perch, cod, and several members of the salmon family receive the greatest amount of attention. The Dominion of Canada appropriates about as much annually to public fish culture as all Europe, while the U. S. devote to the work many times the amount granted in Europe and the Dominion. Public fish culture in many countries is conducted through the agency of scientific bureaus and associations. Thus, in Norway, operations are carried on by the Society for the Development of Norwegian Fisheries; the Netherlands has its commission for the sea fisheries, to which the government refers all matters relating to fishery interests; in Germany the Deutscher Fischerei Verein (German Fishery Union) and the Commission for the Investigation of the German Seas are partly supported by public funds; Scotland has a fishery board, chiefly for the inquiry into the proper basis of fishery legislation, but partly engaged in marine fish culture at its Dunbar station.

Fish'er, John, 1459–1535; English prelate; b. Beverley; was a zealous opponent of the Reformation; became Chancellor of the Univ. of Cambridge, 1501, and Bishop of Rochester, 1504. He opposed the divorce of Henry VIII from Catherine of Aragon; refused to take the oath of allegiance in 1534, was attainted and beheaded. Just before his execution Pope Paul III made him a cardinal.

Fisher, largest of the martens; the *Mustela pennantii*, a carnivorous quadruped of the



FISHER (MUSTELA PENNANTII).

Mustelidæ, found in Canada and the U. S., arboreal in its habits, and named from its fondness for fish, which it often steals from the traps of fur collectors, who use fish as a bait for the pine marten. It is 3 ft. long, inclusive of the tail. It is fierce and nocturnal, living chiefly upon birds and small quadrupeds.

Fish'eries, industries based on the taking, for sale, fish or of any other aquatic animals, such as seals, whales, clams, corals, and sponges. The term "fishery" means fishing for business, as distinguished from the angling, which is fishing for sport, and implies the use of fine tackle for the capture of active, well-flavored fish. The development of the fisheries during the Middle Ages was promoted by the demand for fish created by the fasts of the Church; but the discovery, at the end of the fourteenth century of Newfoundland and its fisheries, which to this day surpass all others in magnitude and value, gave the greatest impulse to the business. The French were the first Europeans who engaged in the American cod fishery. In the seventeenth century began these contests between the French and the English about the sovereignty of the fishing grounds, which continued more than a century. The treaty of peace of 1783 confirmed the French in the possession of St. Pierre and Miquelon, and in the right to fish on the W. coast of Newfoundland.

The French herring fishery is of great importance, as is also that of sardines, which is carried on in the Mediterranean and off Brittany. Spanish fisheries flourish mainly in the Bay of Biscay. The home fisheries of the British Islands are of great extent and importance, the herring fisheries of Scotland and Ireland holding the first place. Cod, hake, and ling are also extensively taken in Scotland. Along the English coast are found cod, herring, mackerel, turbot, lobsters, oysters, etc., and in the rivers salmon. The richest Italian fisheries are in the Adriatic, the tunny fishery being the most important. The Norwegian fisheries (chiefly cod and herring), extending along the entire W. and N. coasts of that country, including the adjacent islands, are the most productive in Europe. Along the coasts of Denmark cod is the principal fish, though flounder, salmon, porpoises, oysters, and herring are also taken. The principal Danish fisheries, however, are the dependencies, Greenland, the Farŏe Islands, and Iceland. The principal maritime fisheries of Russia in Europe are: The Caspian Sea, which produces immense quantities of sturgeon and seals; the Black Sea and Sea of Azov, yielding the herring, tunny, salmon, sea trout, and anchovies; and the Baltic, furnishing cod, halibut, salmon, lampreys, etc. The White Sea, abounding in herring, cod, and halibut, furnishes almost the sole support of the inhabitants along the coast. The river fisheries are important, the Volga being the most productive. The coasts of Asiatic Russia swarm with fish, but the fisheries are undeveloped. The waters of China abound in fish, and one tenth of the people derive their food from the water.

The great sea fisheries of the U. S., dating from the earliest settlement of the country,

are mostly carried on from New England. In the treaty of peace, 1783, the right of the Americans to share in the fisheries of Newfoundland and in neighboring waters was secured. The Federal Govt. early recognized the importance of the fisheries, granted bounties, until 1866, for their encouragement, and imposed duties on the importation of foreign-caught fish. During the war with England, 1812–15, British cruisers kept the fishermen from the distant fishing grounds. In the negotiations for peace the British endeavored in vain to procure from the U. S. a relinquishment of their right to the fishing grounds, and maintained, after peace was concluded, that the state of hostilities had abrogated the concession of 1783. Discussions ensued between the two governments, leading to treaties, 1818, 1854, and 1871, by which certain rights of fishing and curing fish were conceded to Americans in the waters and on the shores of the British provinces.

Mackerel are caught on the coast of New England and as far S. as Chesapeake Bay, but the most productive fisheries are in the Bay of Chaleurs and the Gulf of St. Lawrence. Herring are taken in the rivers and bays from N. Carolina northward. American vessels, chiefly from Gloucester, Mass., visit New Brunswick, Newfoundland, the Magdalen Islands, and Labrador for that fish, while the halibut fishery is pursued to some extent from that port on George's and the W. banks and at Greenland. Oysters are found particularly in Chesapeake and Delaware bays. Turtles are abundant in the waters of the Florida Keys. There are valuable shad fisheries in the Connecticut, Hudson, Delaware, and Potomac rivers. Whitefish are the principal object of pursuit of the Great Lake fisheries. The fisheries of Alaska are of vast extent and productiveness, cod is the chief item, but halibut and herring are numerous. The salmon fisheries of the Columbia River are also of great value. The British American colonies are the seat of fisheries among the richest in the world. The rivers of British Columbia swarm with salmon, and the waters of the coast abound in cod, herring, halibut; but the fishery is undeveloped. Whitefish and trout are found extensively in Manitoba and the NW. territories, particularly in the waters that empty into the Hudson Bay. Whale fishery is carried on chiefly by vessels from San Francisco, Provincetown, and New Bedford, Mass., and from Newfoundland and Norwegian ports.

In 1906 the total value of the products of the fisheries of the U. S. was reported as $56,737,777. The most valuable products were oysters, $18,449,104, and salmon, $14,121,288, and the exports of fisheries products aggregated in value, $7,559,178.

Fish'erman's Ring, seal ring worn by the pope, who with it seals certain briefs, said to be "given under the fisherman's ring." It bears a figure representing St. Peter fishing, is borne by the popes as St. Peter's successors, and has been used since the thirteenth century. The origin of this custom is not known. The habit of wearing a ring as a token of authority (for instance, Pharaoh's ring) is extremely old. A ring similar to that worn by the pope belongs to the official costume of a Roman Catholic bishop.

Fish'ery Laws, laws which define and regulate the rights of the public or of individuals to fish in natural or artificial bodies of water, public or private. The rules of the English common law regulating fisheries are of a twofold variety, since navigable waters—by which is meant, in legal usage, those in which the tide ebbs and flows—are distinguished from those which are not navigable. In streams above the reach of the tidal flow the soil to the center of the river bed belongs to the proprietors upon the respective banks, and each possesses an exclusive right of fishery in that half of the stream over which his ownership extends. If the land on both sides is vested in the same person, his fishing privilege pertains to the whole width of the river as far as the boundaries of his property along the course of the river may extend.

This exclusive right, however, must be exercised so as not to interfere with the public convenience in passing on the stream in boats or rafts, and no dams or other obstructions can be made which would prevent the free passage of fish, unless such privilege be given by statute. In navigable or tide waters the soil is vested in the sovereign, and the right of fishery is common to the entire public. A special or exclusive privilege can only be created by legislative grant or by prescription, which must be clearly proved, and which is very unusual. This right of all persons to fish in public waters is called a common fishery. When several have a right to fish in a private stream in derogation of the owner of the soil, it is termed a common of fishery or of piscary. The designation "free fishery" is applied to an exclusive right in a navigable river arising by grant or prescription, without any right in the soil, while the term "several fishery" is employed when, in connection with such an exclusive grant, a property in the soil is also given. These various terms are, however, often employed without precision of meaning.

In the prosecution of the cod, mackerel, and other fisheries along the coast of Newfoundland and the other British possessions much hostility was created between British fishermen and those of the U. S. on account of the practices of the latter in fishing unlawfully in bays and inlets, and in drying and curing their fish upon British shores. The high seas are free and open to all nations, and people of any nationality may fish therein without restriction, but this right ceases at the mouths of rivers and in bays and harbors along the coast of any country, to the distance of a marine league from the shore. Foreigners can acquire a privilege to catch fish in places of this kind only by grant of the state or sovereign. At times the colonial authorities have used force to drive away U. S. fishermen from the Newfoundland and Canadian coasts. In order to remedy these difficulties, various treaties have from time to time been negotiated

between the U. S. and Great Britain granting certain privileges reciprocally to the inhabitants of either country.

Fish Glue, isinglass not refined for culinary and medicinal purposes, but suitable for cements, etc.; prepared from offal of the fisheries, and has a strong fishy odor.

Fish'hawk, common name of the osprey, one of the birds of prey, so called from its feeding on fish which it captures by swooping on them when they are near the surface. Its



American Fishhawk or Osprey.

general color is vandyke brown above, the quill feathers blackish, and the head, neck, and under parts white. The outer toe, as in owls, can be turned backward and the powerful feet are furnished with sharp spikes which aid in holding a slippery prey. The length is about 2 ft., the spread of wing 4½, and, as in most birds of prey, the female is larger than the male. By preference the fishhawk nests in tall trees near the water. The nest, which is a bulky affair of sticks and weeds, repaired and added to yearly, is so large that small birds frequently build their nests in its interstices. This species ranges over the greater part of the warm and temperate zones, its American members being often treated as a distinct geographical race or subspecies. The fishhawk is often plundered by the bald eagle.



Head and Foot of American Fishhawk.

Fish'ing Boun'ties, bounties varying from $1 to $2.50 per ton, given during the period of British rule over N. America to all vessels employed for four months at least in each year on the Newfoundland Banks or other fisheries. Three eighths of the bounty went to the owner of the vessel, the remainder to the fishermen. During the Revolutionary War this system fell out of use, but by Act of Congress, 1792, it was reëstablished, on the ground that the state received benefit from the fisheries as nurseries for seamen. Fishing bounties were finally abolished in 1854.

Fish Plates, pair of plates placed on opposite sides of a joint in a beam, and connected by bolts passing through the beam. The fish joint for railway rails was first used in England in 1847, the plates being 18 in. long, 3 in. wide, ¾ in. thick, and bolted through the rails by four bolts in oval holes, so as to allow for changes in length of the rails due to temperature. This joint lacks stiffness and has mostly passed out of use, the angle-bar joint having taken its place.

Fiske, John (original name Edmund Fiske Green), 1842–1901; American historical and philosophical writer; b. Hartford, Conn.; abt. 1855 took the name of his maternal great-grandfather; was Lecturer on Philosophy at Harvard, 1869–71; Instructor in History, 1870; Assistant Librarian, 1872–79; overseer of the same institution, 1879–91; Lecturer on American History at Washington Univ., St. Louis, at University College, London, and at the Royal Institution. He was one of the ablest expounders of Herbert Spencer's philosophy, and of the theory of evolution as propounded by Darwin; believed that he had reconciled the theory of evolution with Christianity. His chief philosophical works are "Myths and Myth Makers," "Outlines of Cosmic Philosophy," "The Unseen World," "The Idea of God as Affected by Modern Knowledge," "The Destiny of Man Viewed in the Light of His Origin," "American Political Ideas Viewed from the Standpoint of Universal History," "Civil Government in the United States," "The American Revolution," "The War of Independence (for Young Readers)," "The Critical Period of American History," "The Discovery of America," "The Beginnings of New England," "The Dutch and Quaker Colonies in America," "Old Virginia and Her Neighbors."

Fissirostres (fĭs-sĭ-rŏs'trēz), applied by Cuvier to a "tribe" of birds comprising the goatsuckers, swifts, and swallows, and so extended by G. R. Gray as to include the trogons, kingfishers, and many other wide-mouthed birds. The group, which was contrasted with *Dentirostres* and *Tenuirostres*, was purely artificial and the birds comprising it are now distributed in various orders.

Fis'tula, an abnormal canal, usually of small length and diameter, leading from one organ to another (as a vesicovaginal fistula), or from some cavity of the body to the external world (as a gastric or biliary fistula or *fistula in ano*). Fistula is (1) complete, when it has two orifices; (2) incomplete or blind, when it has only one; (3) external, when the opening is through the skin; (4) internal, when it opens only into a cavity of the body. The cure of fistula depends on union of its walls through the agency of healthy granulation cells, brought about by stimulating applications, as nitrate of silver, etc., in solution, or cautery. Where the walls are old and hard it is necessary to dissect and remove them, bringing

the lips of the wound together by stitching. The most common treatment consists in laying the fistula and soft parts above it freely open by an incision, and keeping the orifices of the wound apart, so that it may heal from the bottom.

Fistula is also the farrier's name for a deep-seated chronic abscess in horses, usually upon the withers, and discharging pus through fistulous pipes or sinuses. When seated upon the top of the head it is called poll evil. Hot caustic solutions often cure it; but sometimes the sinuses should be opened up and unhealthy granulation cells cut away.

Fit. See APOPLEXY; CONVULSION; EPILEPSY.

Fitch, John, 1743–98; American inventor; b. E. Windsor, Conn.; worked successively at a number of trades in New Jersey and Pennsylvania; became a surveyor and land speculator; engraved a map of the NW. country on copper; and, 1785, devoted himself to the problem of propelling vessels by steam. He sought aid in vain from Congress and several states, but received from New Jersey the exclusive privilege for fourteen years of using boats propelled by fire or steam. Having formed a company, he completed the model of a steam engine in 1786, and soon propelled a skiff on the Delaware. In 1787 exclusive rights in the use of the steamboat was vested in him by Pennsylvania, Delaware, and New York. In August a new steamboat constructed by him was successfully tried on the Delaware. Fitch constructed other boats, one of which attained an average speed of 7½ m. an hour. After various vicissitudes he committed suicide in Kentucky.

Fitch, commercial name of the fur of the European polecat (*Putorius fœtidus*). It is collected in N. Europe, and though in general inferior in quality to the fur of martens and sables, it is handsome and serviceable, and when in fashion brings a good price.

Fitch. See VITCH.

Fitch'burg, a capital of Worcester Co., Mass.; on a branch of the Nashua River; 25 m. N. of Worcester, the other capital; comprises several villages; principally engaged in making pianos, machinery, tools, electrical apparatus, cotton and woolen goods, engines, firearms, bicycles, and paper; had $13,108,543 capital investment in factories, by 1905 census), with products valued at $15,390,507. Pop. (1905) 33,017.

Fitzger'ald, Edward, 1809–83; English author; b. near Woodbridge, Suffolk; spent his life mostly in his native county in study and literary pursuits; made translations from Æschylus, Sophocles, and Calderon; published a selection from the writings of his father-in-law, Bernard Barton, the Quaker poet. He is best known for his translation, 1859, of the "Rubáiyát" of Omar Khayyam.

Fitzgerald, Edward (Lord), 1763–98; Irish soldier; fifth son of the first Duke of Leinster; b. near Dublin; entered the British army; served in the American Revolutionary War; afterwards was a member of the Irish Parliament; joined the Society of United Irishmen, and became its president in 1796; encouraged other political and military organizations, and negotiated with the French Directory, till a warrant was issued for his apprehension. He secretly directed the revolutionists, but was at length captured after a desperate struggle, in which he was severely wounded, and died in prison.

Fitzher'bert, Maria, 1756–1837; wife of King George IV of England; daughter of Waller Smythe, and successively the widow of Edward Weld and Thomas Fitzherbert. As she was a subject, her marriage (1785) with the Prince of Wales (afterwards George IV) was not valid. Later the prince married the Princess Caroline of Brunswick, and after his quarrel with her returned to Mrs. Fitzherbert; but his excesses compelled her to leave him.

Fitzmau'rice, Henry Charles Petty. See LANSDOWNE.

Fitzroy', Robert, 1805–65; British admiral; b. Anton Hall, Suffolk; entered the navy, 1819; was in command of one of the vessels in the exploring expedition to Patagonia, Chile, and Peru, 1828. In 1831 the *Beagle,* under his command, was fitted out for another surveying expedition, accompanied by Charles Darwin, and returned, 1836. In 1841 Fitzroy entered Parliament; was Governor and Commander in Chief of New Zealand, 1843–46; was placed at the head of the Meteorological Department of the Board of Trade, 1854; promoted rear admiral, 1857; vice admiral, 1863. He committed suicide in a fit of mental aberration due to overwork.

Fiume (fē-ō'mā), free imperial city of Hungary, formerly called Vitopolis; on the Gulf of Quarnero, at the mouth of the Fiumara; 40 m. SE. of Trieste; an important seaport, with an excellent harbor, large shipbuilding interests, and considerable manufacturing. Vitopolis is mentioned as a flourishing town of Liburnia under the Roman emperors; was incorporated with the Hapsburg dominions (Austria), 1471; united with Hungary as a *corpus separatum,* 1776, and with Croatia, 1850; made an independent district, 1870. Pop. (1900) 38,955.

Five Civ'ilized Tribes, the Cherokee, Chickasaw, Choctaw, Creek, and Seminole Indian tribes, now settled in Indian Territory. The separate tribes are also designated nations, as the Cherokee Nation, etc. By acts of Congress (1901, 1902) the tribal governments of these tribes were to cease March 4, 1906, but a later act extended the time one year. See their respective titles.

Five Forks, locality in Dinwiddie Co., Va., 11 m. SW. of Petersburg, noted as the scene of a battle between a Union force under Sheridan and a Confederate one under Pickett, fought April 1, 1865, just after Sheridan had returned from raiding the Shenandoah Valley and rejoined Grant. The battle was the result of a movement by Grant to turn the Confederate right or destroy their line of retreat to the S., and was won by Sheridan, after

desperate fighting. Union loss, 884; Confederate (killed, wounded, and prisoners), 8,500. The next day the final successful assault on the Confederate works at Petersburg was made.

Fives, form of handball, or court tennis, in which the ball is struck with the hand and made to rebound from a wall against which it is again struck after its first rebound from the ground.

Fix'ture, in law, a personal chattel in some way annexed to a house or other piece of realty, but such, or so annexed, that he who put it there may take it away, while the common meaning of the word is, a thing so fixed to the realty that it cannot be taken away. In here speaking of fixtures we shall mean things so fastened to the land (or to a house which is itself fastened to the land) that they cannot be removed against the landowner's will. At common law the rule was almost invariable that anything once attached to the land became the property of the owner of the land; but this is not now the law in England or the U. S. The intention with which a thing was annexed to the premises, and its capability of removal without injury to them, are important elements in determining whether it is a fixture. The ancient rule was first relaxed in favor of trade fixtures, in the case of which a wide power of removal is now allowed; and it was next admitted that an outgoing tenant might take away many articles which he fastened to the house for ornament or convenience, such as mirrors, blinds, and grates. The general rule is that a tenant must remove during his tenancy, or at all events before finally surrendering possession, everything he has a right to take away; and whatever he does not remove he is considered as having intended as a permanent fixture.

Flac'cus, cognomen or surname of several Roman families, of which the most important belonged to the gentes (tribes), Fulvia, Valeria, and Pomponia. The poet Horace also bore this name. Among the illustrious men of the name were (1) LUCIUS VALERIUS FLACCUS, consul with C. Marius in 100 B.C., censor in 97, and again consul in 86, when he was murdered by Fimbria. (2) QUINTUS FULVIUS FLACCUS, consul 237, 224, and 212, B.C., often prætor, and distinguished in the second Punic and many other wars, in which he was fortunate; but his character is stained by his cruel treatment of the Campanians. His family produced many public men, among whom his son, Q. FULVIUS FLACCUS (d. 173 B.C.), and his grandson, M. FULVIUS FLACCUS, were the most renowned. The former was a distinguished general in Spain; the latter, a partisan of the Gracchi, was put to death 121 B.C.

Fla'cius, Matthias (surnamed ILLYRICUS), 1520–75; German Protestant theologian; b. Albona, Venetian Illyria; professor successively of Hebrew at Wittenberg and of theology at Jena, and a preacher in various cities; leader of the rigid Lutherans after Luther's death. Besides writing numerous polemical pieces, was the originator and one of the principal authors of the "Centuries of Magdeburg."

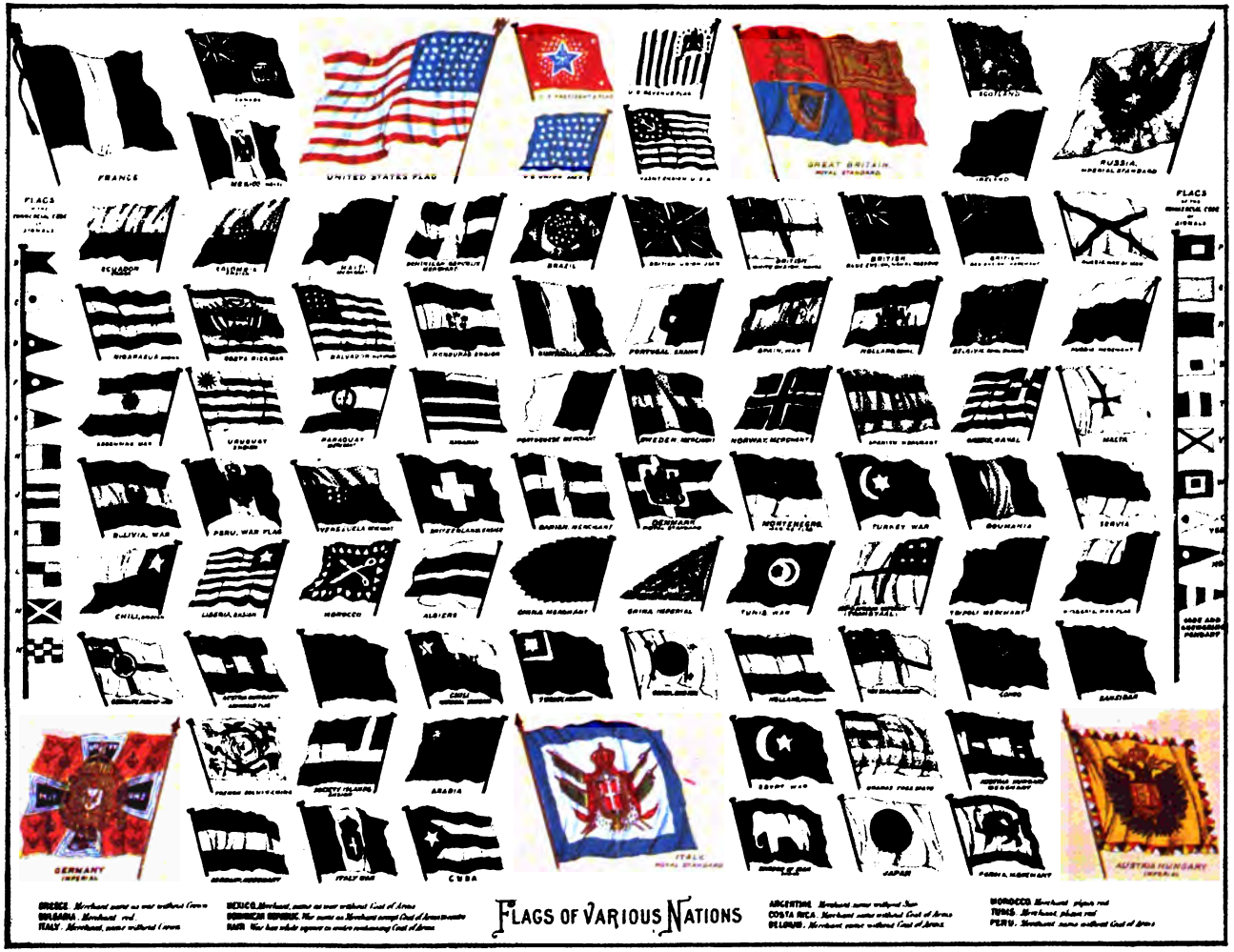
Flag, common name of two families of plants. (1) A family of the *Algæ*, or seaweed class. These have all flagging habits, like the common seaweeds, which are usually fixed to rocks by their roots, while their branches are borne up by the tides, falling again and lying in confused masses one upon another at its recess. The propriety of this homely term is better seen in the genus *Ulva* or laver, of which *U. latissima*, common on the American coast, with a broad, ovate or oblong, undulated, bright green frond, may be seen lying on the soft ooze at low tide, and floating near the bottom at high tide. *U. enteromorphia*, with tubular, membranaceous, green, netted fronds, is still more flaccid, and is easily collected from rocks and beaches, when thrown up by the winds. A dark purple kind may be noticed on the piles and posts of wharves, hanging loosely down, like broad shreds, growing also on rocks between high and low-water mark.



ULVA LATISSIMA.

(2) The iris family, which bear conspicuous flowers, some of great splendor. The sword flags are stiff, erect, very long-leaved plants, with spikes of showy purple, scarlet, rosy, or white blossoms, and large flat tubers, requiring heat, moisture, and sunshine while growing, but entire rest and dryness when dormant. Natives of the Cape of Good Hope, few garden flowers exceed them in gorgeousness or beauty, and few require so little care. One of the best known of these is the gladiolus.

Flag, piece of cloth to be displayed to indicate, by shape, color, or symbols a nationality, dynasty, rank, party, or association. Among the Egyptians each battalion had a distinguishing emblem representing some sacred object. The Greeks bore as symbols sometimes the emblem of a divinity, sometimes an initial letter. The Roman standards changed with their conquests, and succeeding emperors displayed new forms and new emblems. Nearly all the standards and ensigns of modern nations are rectangular, but the naval flag of


FRANCE
UNITED STATES FLAG
GREAT BRITAIN
ROYAL STANDARD
RUSSIA
IMPERIAL STANDARD
FLAGS OF VARIOUS NATIONS
GERMANY
ITALY
AUSTRIA HUNGARY
CUBA
JAPAN

Sweden has three points, that of Denmark two, and the flag of China is triangular. Some of the principal European nations have each two or more flags, a royal or imperial standard, a national ensign, a naval ensign, and a flag for merchantmen. The royal standard of Great Britain displays the heraldic insignia of England, Scotland, and Ireland, quartered. The national flag, called the "union jack," is blue, charged with the three crosses of St. George, St. Andrew, and St. Patrick. This combination forms the canton in the British naval and commercial flags.

In the twelfth century the standard of France was white, sprinkled with golden *fleurs-de-lis*. Henry IV adopted the white flag charged with three golden *fleurs-de-lis* on a blue shield. It was succeeded, 1792, by the tricolor. The imperial standard of Germany is white charged with a black cross, with the black eagle of the empire at its intersection. In the dexter canton is the cross of Prussia on a black, white, and red field. The Russian imperial standard is yellow charged with the double-headed eagle. The imperial standard of Austria is yellow also, charged with the double-headed eagle, but it has an indented border of gold, silver, blue, and black. The royal standard of Italy is green, white, and red, in equal vertical bars; on the white are the arms of Savoy surmounted by the crown. The royal standard of Spain combines the arms of Castile, Leon, Granada, and the *fleurs-de-lis* of the Bourbons. The flag of Sweden is blue with a yellow cross, that of Norway red with a blue cross. The royal standard of Greece is blue charged with a white cross, the canton of the ensign.

The English colonies in America displayed at first the flag of the mother country, of which various modifications were in use at different times. After the battle of Lexington the Connecticut troops displayed on their standards the arms and motto of the colony. The Massachusetts cruisers bore a white flag with a green pine tree. The naval ensign first displayed by Com. Hopkins was yellow, bearing for device a rattlesnake in the attitude of striking, with the motto, "Don't tread on me." On January 2, 1776, Washington raised at Cambridge the "great union" flag, which consisted of the thirteen alternate red and white stripes of the present flag of the U. S., with the crosses of St. George and St. Andrew emblazoned on the blue canton in place of the stars. Congress resolved on June 14, 1777, "that the flag of the thirteen U. S. be thirteen stripes alternate red and white; that the union be thirteen stars, white in a blue field, representing a new constellation." In 1794 the field was changed to fifteen stripes alternate red and white, and the union to fifteen white stars in a blue field. In 1818 the stripes were reduced again to thirteen, and the number of stars made equal to the number of the states. The blue union when used separately is called the Union Jack. When the Civil War broke out the several seceded states used at first distinctive state flags. In March, 1861, the Confederate Congress adopted the "stars and bars." In September a battle flag was adopted, and in 1863 the "stars and bars" was supplanted by a flag with a white field having the battle flag for a union. In 1865 the outer half of the field beyond the union was covered with a vertical red bar. This was the last flag of the Confederacy. See BANNER.

Flag'ellants, name given during the Middle Ages to various societies of penitents, who went about scourging themselves in public. They first arose in 1056, under St. Peter Damian. In the thirteenth century they became very common in Italy. Abt. 1349, at the time of the "Black Death," the flagellants spread over all Europe, proclaiming the coming of Christ, and the necessity of purification by penance and the shedding of blood. Both civil and ecclesiastical authorities opposed these fanatics, and Pope Clement VI issued a bull against them. After the Council of Constance they disappeared. The name of flagellants was also applied to some pious guilds approved by the Church.

Flageolet (flăj'ō-lĕt), musical instrument; a wooden or ivory tube with a mouthpiece at one end, the other end being open. It has one large aperture near the mouthpiece and six or more finger holes. Its invention is ascribed to one Flavigny, 1580, but the flutes of the ancients, like those of some modern barbarous peoples, were simply flageolets.

Flag Of'ficer, in the navy, one of such rank as to entitle him to fly a flag instead of the narrow pennant flown to show that the vessel is commanded by an officer of lower rank, such as a captain. The flag officers of the U. S. navy are: admiral, vice admiral, rear admiral, and commodore. The second and fourth of these grades are not at present found on the active list. The admiral's flag flies at the mainmast, the vice admiral's at the foremast, and the rear admiral's at the mizzen.

Flag'stone, stone separable into broad flat slabs suitable for sidewalks, curbing, doorsteps, etc.; derived from sandstones and limestones of the sedimentary series and slates and schists of the metamorphic, all of which are sometimes divided by natural partings into layers of convenient thickness. A variety of sandstone called bluestone, occurring at various horizons in shales of Devonian age and obtained from many localities in New York, New Jersey, and Pennsylvania, is largely used for this purpose. Flagstones do not belong to any particular geologic age, and they occur at so many localities that the extent to which they are quarried in any region depends largely on the local demand. Prominent among the present sources of supply are the bluestone just mentioned, the Medina sandstone (Silurian) of New York, the Waverly sandstone (Devonian) of Ohio, and the Triassic "brownstone" of Connecticut and New Jersey.

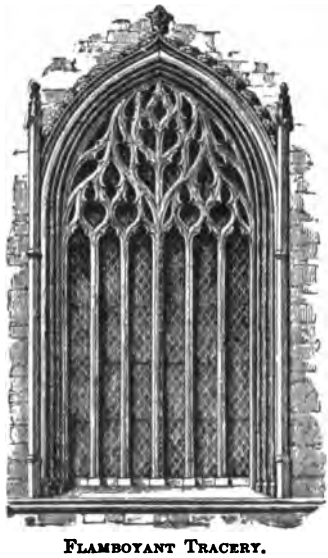
Flag of Truce, white flag displayed to an enemy to show a desire to communicate or to suspend hostilities. Under the rules of civilized war a messenger bearing a flag of truce, if admitted within the enemy's lines, has a sacred character. But the party visited must judge

whether it is inexpedient to admit such an envoy, and may use all precautions, such as blindfolding him en route from the outposts to headquarters, so that he may not spy upon the disposition of the forces. To fire upon a flag of truce is a treacherous breach of the rules of war, and may be punished by severe reprisals.

Flahaut de la Billarderie (flä-ō′ dė lä bēyärd-rē′), **Auguste Charles Joseph** (Comte de), 1785–1870; French general and diplomatist; b. in Paris; entered the army, 1799; was aid-de-camp to Napoleon, 1813; distinguished himself at Leipzig, and was made a general of division and count of the empire; he left France after the second Bourbon restoration, but returned in 1827, and in 1830, by the Revolution, was restored to his rank. He was ambassador to Berlin, 1831, to Vienna, 1841–48, to London, 1860; became a Senator in 1853.

Flam'borough Head, noted promontory on the Yorkshire coast, England; formed by a range of steep, almost perpendicular chalk cliffs, from 300 to 450 ft. high. It bears on its headland a lighthouse whose revolving light can be seen for 30 m. Across the peninsula runs a ditch with ruins of old fortifications, called "Danes' Dyke."

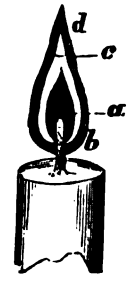
Flamboy'ant, in architecture, a term designating a florid and showy style of design and decoration; especially that phase of mediæval French architecture which prevailed during the fifteenth century. Minute openwork tracery



Flamboyant Tracery.

with flowing lines and "fish-bladder" or "palm-leaf" openings, whose flamelike outlines gave rise to the name of the style; arches of various forms inclosed under hood molds of ogee outline, terminating in rich finials; a laxity of profiles in the moldings; the frequent suppression of interior pier caps, and a realistic and pictorial treatment of decorative sculpture, are characteristic of this period, which corresponds to the "Perpendicular" in England.

Flame, burning gas or vapor; it may or may not be luminous, *i.e.*, bear incandescent particles; and from these or the highly heated gaseous substance it may have almost any tint. The structure of a flame is best observed in the burning of a sperm or tallow candle, or an oil lamp having a solid wick. In the candle flame, the central dark inner cone, *a*, surrounding the wick and reaching a short distance above it, is chiefly composed of light and heavy carburetted hydrogen gases, such as are contained in common illuminating gas, formed by the action of heat on the melted fat, of nitrogen obtained from the air, of watery vapor, and also of carbonic oxide and carbonic-acid gases. In the blue zone, *b*, at the base of the flame, the gas of the base of the inner cone is completely burned by oxygen less rarefied than that which reaches other parts of the flame. That part of the flame which furnishes the principal part of its light is called the luminous cone, represented at *c*. It is luminous in consequence of the incandescence of minute particles of solid carbon which have been formed by the abstraction of hydrogen from the carbohydrogen gas, and its union (burning) with oxygen. The supply of oxygen to the inner parts of this flame is not sufficient to consume the carbon, but the combustion of hydrogen furnishes sufficient heat to produce white light in the particles of solid carbon. The combustion is completed in the outer cone, *d*, called the mantle, by the union of carbon and remaining unconsumed gases, with oxygen. It is much less luminous than the cone last described, the light being caused by incandescent gas and vapor.



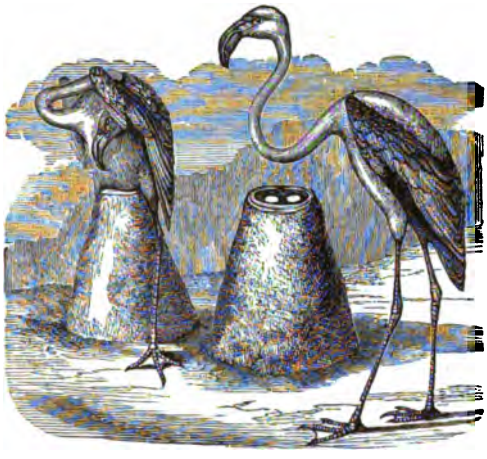
Candle Flame.

Flamel (flä-mĕl′), **Nicolas,** abt. 1330–1418; reputed French alchemist; was a copyist and bookseller; became wealthy; endowed many charitable and religious institutions; and was supposed to have discovered the philosopher's stone. A metrical treatise on alchemy, published probably by Gohorry under Flamel's name (1561), made him famous as an alchemist till Vilain investigated his history (1761).

Fla'men, in Roman antiquity, a member of a college of priests, established by Numa, each of whom was confined to the service of a particular deity. The original three, the *dialis*, *martialis*, and *quirinalis*, consecrated respectively to Jupiter, Mars, and the deified Romulus, were afterwards distinguished as *majores*, and chosen from a select class of the patrician order; while the later twelve, *minores*, were elected from the plebeians.

Flamin'go, bird of the genus *Phœnicopterus*; distinguished by a bill bent downward for half its length and provided with toothlike projections similar to those of a duck's bill. The neck and legs are long, the feet webbed. On

account of their long legs the flamingoes were formerly classed with the waders, but they seem rather to be aberrant ducks, *i.e.*, to be the result of variation from an original duck type. Several species are known inhabiting



FLAMINGO.

tropical or warm countries, the most familiar being *P. antiquorum* of S. Europe and N. Africa, and *P. ruber* of tropical America, the latter still occasionally found in Florida and along the Gulf coast, although it has been practically extirpated in those localities.

Flamin'ian Way, principal N. road which led from ancient Rome; was laid out from the Flaminian gate of Rome to Ariminum by C. Flaminius the Elder, 220 B.C., during his censorship, and, with its extensions and branches, reached nearly all the large towns of N. Italy. Its remains are still visible.

Flamini'nus, Titus Quintius, abt. 230–175 B.C.; Roman general; elected consul, 198; defeated Philip of Macedon at Cynoscephalæ, Thessaly, 197; and at the isthmian games in 196 proclaimed the freedom of those states which had been subdued by Macedon. In 195 he curbed the tyrant Nabis of Sparta and restored peace and prosperity to Greece, and the next spring had a triumph of three days in Rome.

Flamin'ius, Caius, d. 217 B.C.; Roman general; tribune of the people in 232, consul in 223 and 217, censor in 220. In his first consulship he gained a victory over the Insubrians, after being defeated by the Gauls and recalled by the Senate. The Circus Flaminius and Via Flaminia were the monuments of his censorship. In his second consulship he fell in the battle with Hannibal near Lake Thrasymenus.

Flammarion (flä-mär-ē-ōn'), **Camille,** 1842–; French astronomer; b. Montigny-le-Roi; became an editor of *Cosmos*, 1863, and took charge of the scientific department of the *Siecle*; was a popular lecturer on astronomy, an aeronaut, an advocate of spiritualism, and Prof. of Astronomy at the Polytechnic Association. His best-known works are: "The Plurality of Inhabited Worlds," "Celestial Wonders," "The Atmosphere," "Urania," "The Planet Mars and its Habitability," "Popular Astronomy," "Lumen," "Travels in the Air," "God in Nature," etc.; contributor to the New York *Herald*.

Flam'steed, John, 1646–1719; first English astronomer royal; b. Denby; Astronomer Royal in 1675; finished the observatory at Greenwich, 1676. Here he passed his life and determined the position of 2,934 stars; erected a mural arc, 1689; quarreled with Newton, but ultimately adopted his philosophy. His great work was "Historia Cælestis Britannicæ," published 1725, the first trustworthy catalogue of the fixed stars.

Flan'ders, territory formerly comprising two provinces of Belgium (E. and W. Flanders), the S. portion of the province of Zealand, in the Netherlands, and two departments of France (Nord and Ardennes). In the latter part of the ninth century this territory was given by the French King, Charles the Bald, as a fief to his son-in-law, Baldwin with the Iron Arm, Count of Vländergan, who gave the country its name, and who by prudent management laid the foundation of an agricultural, industrial, and commercial prosperity which soon made it powerful. On the marriage of Marguerite of Flanders to Philip the Bold of Burgundy (1384), Flanders became united to Burgundy, and a century later (1477), it passed, together with that country, to the house of Hapsburg. On the abdication of Charles V, 1556, Flanders and Burgundy came into the possession of the Spanish line of the house of Hapsburg, under Philip II, but the territory of Flanders was soon considerably diminished, a N. portion being transferred to the States-General by the Peace of Westphalia (1648), and a S. portion being conquered by Louis XIV, and secured to him by the Peace of Utrecht (1713). The remainder of Flanders fell again by the Congress of Rastadt (1714) to the Austrian line of the house of Hapsburg, but in 1794 it was conquered by the French and incorporated with the French Republic. It remained part of the French Empire until the Congress of Vienna (1814) conferred the territory on the kingdom of the Netherlands; to the latter it remained united until the formation of the kingdom of Belgium, 1831, when most of it was incorporated in that country.

Flandin (flän-dăn'), **Eugène Napoléon,** 1809–76; French artist and archæologist; b. Naples; painted "Venice," "The Bridge of Sighs," and "The Storming of Constantine"; accompanied the French ambassador De Sercey to Persia, 1839–42; prepared the official report and drawing relating to that country; coöperated till 1845 with P. E. Botta in exploring Nineveh, and furnished the designs for "Monuments de Ninive." He published a description of the regions between Nineveh and the Gulf of Persia, his travels in Persia, and other works, besides producing many paintings on Italian and Eastern subjects.

Flandrin (flăn-drăn'), **Jean Hippolyte**, 1809–64; French painter; b. Lyons; studied in Paris and Rome, and during five years' residence in Rome after receiving the grand prize he produced "Dante in the Circle of the Envious" and "St. Clair Curing the Blind." After his return to Paris he painted "Christ Blessing Little Children." His portraits and monumental frescoes made him famous, and after 1841 he was employed in decorating public edifices with fresco and stained glass.

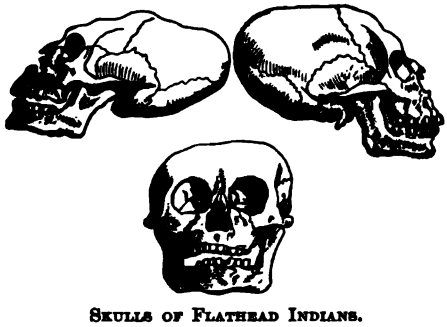
Flan'nel. See TEXTILE FABRICS.

Flat, musical character indicating lowering of the note to which it is prefixed a semitone. On the organ and other keyed instruments each black (or short) key is the flat of the white key on the right hand, and also the sharp of the white key on the left. But as E and F, B and C, are only a semitone apart, and have therefore no intervening black key, F-flat and B-flat are produced by striking the white keys E and B, being the next on the left hand respectively. One or more flats placed at the clef, as B, E, A, D, etc., affect all the notes of similar name in every octave throughout a movement, unless contradicted by a natural. See NATURAL; SHARP.

Flat'fish. See FLOUNDER.

Flat'head Riv'er. See CLARKE RIVER.

Flat'heads, tribes of N. American Indians, so named because they were accustomed to flatten the heads of their children artificially; included some Catawbas and Choctaws, nearly



SKULLS OF FLATHEAD INDIANS.

all the Muskhogean tribes, the Natchez, Tonikas, Chinooks, and most of the Salishes; but, curiously, the people officially known now as Flatheads—the Salishes proper—never flattened the head.

Flat'tery, Cape. See CAPE FLATTERY.

Flaubert (flō-bār'), **Gustave**, 1821–80; French novelist; b. Rouen; was a forerunner of the realistic school. His "Madame Bovary" (1857) was an unqualified literary success, but involved him in legal proceedings on account of its alleged immorality; "Salammbo," 1862, is a novel embodying the results of his explorations about Carthage. His other works include "L'Éducation sentimentale: histoire d'un jeune homme," 1869, and "Tentation de Saint Antoine," 1874.

Flav'el, John, abt. 1627–91; English clergyman; b. Bromsgrove; was ejected from the rectory of Dartmouth, 1662, for nonconformity, but continued to preach in private; and in 1687 resumed his public labors. His works, including "Husbandry Spiritualized," "A Treatise of the Soul of Man," "Personal Reformation," and "Divine Conduct," have been many times printed.

Flavia'nus, abt. 309–404; patriarch of Antioch; in early life was a lay monk, zealous for the faith, and according to Theodoret, he, with Diodorus, his associate, first devised the choir and introduced the responsive singing of the Psalter. In 381 was chosen Bishop of Antioch to succeed Meletius, but was not fully acknowledged until 390; in 387 interceded with Theodosius the Great for the seditious people of Antioch. He strongly opposed Arianism and the Mersulians.

Flavianus, Saint, d. 449; ecclesiastic; became Bishop of Constantinople in 446, and was from the first opposed by Theodosius II, the emperor, who favored the Eutychian heresy. Flavianus called a synod which deposed and excommunicated Eutyches, 448, but in 449 the emperor convened a council at Ephesus ("the robber council"), presided over by Dioscurus, Bishop of Alexandria, who was the enemy of Flavianus. The latter, who was present, was deposed and ordered to be banished, but was set upon and so beaten that he died.

Fla'vius, name of many eminent Romans, mostly of the *gens* Flavia, an ancient plebeian stock, but many of the Flavii who figure in history were undoubtedly not of this gens, and were indeed not even Romans in a strict sense. GNÆUS FLAVIUS, a Roman jurist, who was curule ædile, 304 B.C., was the son of a freedman and secretary to Appius Claudius Cæcus. His publication of the "Jus Flavianum," embracing the secret rules of judicial procedure, hitherto known only to pontiffs and patricians, caused indignation against the latter, and made him exceedingly popular with the common people. Vespasian, Constantine the Great, and many other Roman emperors, bore the name of Flavius.

Flax, plant important as the source of the fiber from which linen is made, and of flax seed. Like the more important cereal grains, flax was known throughout the ancient civilizations in the East. It is known throughout the civilized world, and is valued as almost indispensable. Its botanical name is *Linum usitatissimum*. The genus *Linum* contains several species, of which this is the only one of special value or importance. The plant is an annual of quick growth, and probably a race which originated from a species still indigenous to S. Europe. It grows from 1 to 3 ft. high. The leaves are alternate on the straight slender stem and branches. The flowers, in loose terminal panicles, are blue, about an inch in diameter, having a calyx of five sepals, a corolla of five petals, five stamens, and a pistil having five styles. The petals drop within a few hours after the flowers

open, and the seed heads, called bolls, form rapidly, becoming finally nearly globular. These consist of ten cells, each holding a flat oval seed, reddish brown, smooth, and glossy. In good soil the plant branches freely, blossoms profusely, and yields a proportionately large quantity of seed.

The stalk is a woody cylinder, more or less pithy and hollow when dry, and inclosed in a bark of long, strong, silky fibers cemented by



FLAX.

a kind of glue, and encased in an outer bark or skin that adheres as if glued to the fiber. The fiber—when freed by the processes of rotting or retting, to destroy the glue; breaking, to free it from the woody cylinder; scutching, to whip out the small particles of bark and stalk adhering; hatcheling, to straighten it and free it from tangles—is nearly pure bast, of a light grayish-brown color inclining to green, exceedingly tough, capable of being spun and woven, of being bleached to snowy whiteness and of taking color in dyeing, which it holds faster than cotton, though it does not take readily so many dyes. The seed consists of the embryo or kernel and its outer coverings, principally its reddish-brown shell; this latter yields a thick, glairy gum, semisolid when cold. The kernel is rich in a valuable oil (which possesses the property of "drying" or hardening in the air to a great degree by which process of drying it gains, instead of losing weight). Powdered flaxseed and powdered oil cake (linseed meal) are much used in medicine for poultices, etc., and are useful, through their long retention of heat and moisture. The cake remaining after the oil is extracted from the seeds makes when ground a palatable and nutritious food for animals, largely used in the U. S. and Great Britain.

The world's productions, 1905, were: Fiber, 1,453,285,000 lbs.; seed, 100,631,000 bu. The U. S. yielded more than one fourth of the total amount of seed, its crop having a farm value of $24,049,072. In Europe, Russia leads in flax production; then come, in order, Austria, Italy, Belgium, France, and Ireland. The finest flax is used for making lace. In the U. S. this crop is cultivated almost wholly for the seed; the lint being roughly treated and used for cordage and coarse fabrics.

Flax, False. See GOLD OF PLEASURE.

Flax'man, John, 1755–1826; English sculptor; b. York; studied at the Royal Academy, supporting himself by designing for the Wedgwoods and others; spent the period, 1787–94, in Rome. He produced two series of outline illustrations of Homer and Æschylus, a series of illustrations of Dante, a series of compositions on biblical subjects, and numerous statues. His "Shield of Achilles" and "Archangel Michael Vanquishing Satan" are considered among the finest achievements of modern art. In 1810 he became Prof. of Sculpture, Royal Academy.

Flea, common name of insects of the family *Pulicidæ*, wingless creatures, by some considered as degraded forms referable to the *Diptera*, or two-winged insects. They infest the higher animals, the common flea (*Pulex irritans*) attacking man as well as beast, while other species attach themselves to the dog, cat, mole, and other mammals. The chigoe is another flea which troubles man. Most fleas have



FLEA.

great powers of leaping. So-called trained fleas are made to go through acts like pulling a miniature carriage, etc., which apparently show intelligence, but are really due to the mechanical restraints the creatures are under.

Flea'bane, various herbs of the *Compositæ*, especially of the genus *Erigeron*. The destructive powers of various composite plants on insects appear to reach their maximum in *Pyrethrum carneum* and *roseum* of Asia and Europe, the leaves of which are used as an ingredient of Persian insect powder.

Fleet Mar'riage, marriage performed at the Fleet prison in London, which, like Gretna Green in later times, and May Fair and the Savoy at an earlier date, was long a famous resort for clandestine marriages. Fleet marriages are first mentioned in 1613; in 1754 they were forbidden by statute. The officiators were Church of England clergymen in prison for debt.

Fleet Pris'on, or **The Fleet,** debtors' prison in London; before 1200 in use both as a debtors' and king's bench prison. In 1641, on the abolition of the Star Chamber, it became, like the Marshalsea, a debtors' prison. In 1842 it

was abolished by statute, and in 1845 pulled down. It was the scene of many disgraceful abuses.

Fleischer (flī'shĕr), **Heinrich Leberecht,** 1801–88; German Orientalist; b. Schandau, Saxony; was made professor at the Kreuzschule, Dresden, 1831, and in 1836 came to the chair of Oriental Languages, Univ. of Leipzig, where he died. He edited Abulfeda's "Moslem History," "Ali's Hundred Sayings," Baidhavi's commentary on the Koran, and wrote a "Critical Dissertation on Habicht's Glossary to the First Four Volumes of the Thousand and One Nights," and a "Grammar of the Modern Persian Languages."

Flem'ing, John, 1785–1857; Scottish naturalist; b. Bathgate, Linlithgow; was a Prof. of Natural Philosophy, King's College, Aberdeen, 1832–43; became Prof. of Natural Science in the Free Church College of Edinburgh, 1845. He wrote "Philosophy of Zoölogy" and "History of British Animals."

Fleming, Margaret, 1803–11; child friend of Sir Walter Scott; b. Kirkcaldy, Scotland; beloved by the great romancer for her precocity, charming ways, and quaint manner of expressing herself in verse, and in prose (her "Diary"). See "Pet Marjorie," by Dr. John Brown.

Flem'ish or Bel'gian Dutch, a low German language spoken by the Flemings of Belgium, N. Brabant, Holland (where it merges into Holland Dutch), and the department of Le Nord, France. See FLANDERS.

Flensborg (flĕns'bŏrg), town of Schleswig, Prussia; at the W. end of Flensborg Fjord; has good shipyards, manufactures of iron, liquors, tobacco, etc., and a sugar-refining industry. One of the most interesting features of the town is the great tomb in which the Danes buried their dead after the battle of Idsted, 1850. Pop. (1900) 48,922.

Fletch'er, Andrew, 1653–1716; Scottish publicist; b. Saltoun. As a member of the Scottish Parliament, 1681, opposed the royal court, and was forced to retire to Holland; returned to England, 1683; took part with the Duke of Monmouth, 1685. He served in Hungary against the Turks in 1686; returned to England with William of Orange, 1688; brought forward the bill of security in the Scotch Parliament, May, 1703; and opposed the terms of the union in 1706.

Fletcher, John, 1579–1625; English dramatist; b. Rye, Sussex; son of the Bishop of London; was educated at Cambridge; devoted his life to writing for the stage. He produced alone, or in conjunction with Francis Beaumont, fifty-two dramas, among the best of which are "The Maid's Tragedy," "Philaster," "The Faithful Shepherdess," "The Knight of the Burning Pestle," "The Scornful Lady," "Rule a Wife and Have a Wife," and "The Spanish Curate." See BEAUMONT, FRANCIS.

Fletcher (originally *de la Flechère*), **John William,** 1729–85; English clergyman; b. Nyon, Switzerland; served in the Portuguese and Dutch armies; visited England, entered the Established Church, 1757, becoming vicar of Madeley in 1760. He wrote in defense of Wesley's Arminianism. The Countess of Huntingdon appointed him president of her theological school at Trevecca, Wales, 1768. His principal work was "Checks to Antinomianism," and was one of the founders of Methodism, and a man of great industry and piety.

Fletcher, Phineas, 1582–1650; English poet; b. Cranbrook, Kent; became rector of Hilgay, Norfolk, 1621. His poems include "The Locustæ, or Apollyonists," a satire against the Jesuits; "Sicelides, a Dramatic Piece," "Joy in Tribulation," "The Purple Island, or The Isle of Man," together with "Piscatoric Eclogues and other Poetical Miscellanies." He was a cousin of Fletcher, the dramatist, and a brother of Giles Fletcher (1588–1623), a clergyman, and author of the fine poem, "Christ's Victory and Triumph."

Fleur-de-Lis (flĕr-dĕ-lē'), "lily flower," flower of the *Iris sambucina* (Iris family), a plant native in the S. of Europe, and cultivated for many centuries in gardens. This flower is famous as the emblem of the French kings, whose arms in later times were azure, three *fleurs-de-lis*, or, borne, two and one. The Frankish kings employed the *fleur-de-lis* as a badge long before the rise of heraldry.

Fleurus (flē-rūs'), town of Hainaut, Belgium; 7 m. N. of Charleroi. Here Gonsalvo of Cordova was defeated by the Duke of Brunswick and Count Mansfeld, August 29, 1622; Waldeck was defeated by Marshal Luxembourg, July 1, 1690; and the Prince of Coburg, having gained here a virtual victory over Jourdan, June 26, 1794, lost its fruits, and indeed the whole of Belgium, by bad strategy after the fight. The battle of Ligny, 1815, took place a mile or two N. of Fleurus.

Fleury (flē-rē'), **André Hercule de,** 1653–1743; French prelate; b. Lodève; in 1715 became preceptor to Louis XV; in 1721 was admitted to the Academy. In 1726 he assumed the post of Prime Minister of France, and was made a cardinal. Lacking the vigor to carry out his policy of peace and national economy, he was dragged into two wars, whose unsuccessful issue was due in no small measure to his mismanagement and parsimony.

Fleury, Claude, 1640–1723; French historian; b. Paris; was advocate to the Parliament of Paris, 1658–67; tutor to the princes of Conti, 1672, *seq.*; subpreceptor with Fénelon to the dukes of Burgundy, Anjou, and Berri, 1689–1706; was abbot of Loc-Dieu, 1684–1706; prior of Argenteuil after 1706, and confessor to Louis XV, 1716–22. In 1696 he was admitted to the French Academy; published "Ecclesiastical Law," "Historical Catechism," etc., but his greatest work is his "Ecclesiastical History" (twenty volumes).

Fleury, Louis (Chevalier and Vicomte de), abt. 1740–94; Franco-American military officer; b. Limoges, France; joined the American Revolutionary army, under a captain's commission from Washington; served at Fort Mifflin on

the Delaware and at the battle of Brandywine, and was promoted lieutenant colonel. In the winter of 1777–78 he was subinspector under Steuben; June 4, 1778, he became adjutant general of Lee's division. In July, 1778, he was second in command of a battalion of light infantry in the Rhode Island expedition, after which he commanded a battalion of light infantry under Washington; received the thanks of Congress and a silver medal for gallantry in the storming of Stony Point, 1779. He returned to France, 1780, with Rochambeau, and became one of his officers; was executed in Paris.

Flex'ible Sand'stone, sometimes called ITACOLUMITE, a metamorphic siliceous rock found in the S. Alleghanies, and especially in Brazil. It occurs in thin layers, which are to a certain degree flexible, but are not elastic. Such sheets may be bent forward and backward hundreds of times without breaking. The cause of this peculiar property of itacolumite has been much discussed. Prof. Wetherell, of Philadelphia, after a careful microscopic examination of the granules of quartz which compose this rock, announced that he had discovered that they are elongated and interlocked, each particle working in a kind of joint. This statement has been denied by subsequent observers, but the weight of authority is in favor of its acceptance. Gold and diamonds are frequently found with itacolumite, and it has been thought that the association of the two latter was something more than accidental. No relationship has, however, been proved to exist between them.

Flick'er, a popular name, derived from its note, of the *Colaptes auratos,* or golden-winged woodpecker, one of the finest birds of the E. U. S. It is about 12 in. long, olive brown in general tint, but shows white feathers when in flight, and has a scarlet marking on the neck. It has over thirty-six popular names, among which are yellow-hammer, yacker, clape, sapsucker, etc. On the Pacific coast and W. of the Rockies a slightly different species is found, known as the red-shafted flicker. Flickers live largely on ants, grubs, and other insects, as well as on vegetable foods; the tongue, being plentifully smeared with saliva, is used to probe ant-hills or to pick insects from the ground. If a flicker's nest is robbed, she will keep on laying till some twenty eggs have been deposited.

Flint, capital of Genesee Co., Mich.; 61 m. NW. of Detroit; seat of the Michigan Institution for the Deaf and Dumb and of Oak Grove Home, a private institution for the insane; has a large number of steam sawmills (about 50,000,000 ft. of lumber annually), flour and woolen mills, carriage, wagon, and bicycle factories, and other industries. Pop. (1904) abt. 15,000.

Flint, seaport, Flintshire, N. Wales; on an arm of the Dee; 13 m. NW. of Chester; has a large trade, exporting coal and lead, and importing much lumber; has also chemical and lead-smelting works. Here Richard II surrendered to Bolingbroke, 1399.

Flint, variety of quartz, massive, dull-colored, and dark, with translucent edges, found especially in nodules or lumps in chalk beds, and consisting largely of fossil diatoms, sponges, and the like. Its nodules frequently inclose a large fossil. In prehistoric times it was used as the material for knives, arrowheads, and other weapons. Its use for kindling tinder by striking fire with steel is gone by, as is its similar use in firearms. Flint is employed in making some kinds of glass, and ground flints are an ingredient of porcelain. Flint is in some places used as a building stone.

Flint Glass, variety of glass which contains a large percentage of lead. Powdered flint was formerly used in the manufacture, whence the name. Flint glass is used largely in making achromatic lenses, and inferior grades are used in making bottles, tableware, and other glass goods, either blown or molded. Venetian and Bohemian glass articles are celebrated. See GLASS.

Flint Im'plements. See STONE, AGE OF.

Flint'lock. See SMALL ARMS.

Flint Riv'er, in Georgia; rises in Clayton Co., and flows to the SW. corner of the state, where it joins the Chattahoochee in forming the Apalachicola. It is 300 m. long and navigable by larger steamers to Bainbridge, 50 m. from its mouth, and during high water by light-draught steamers to Albany, about 200 m. from its mouth.

Float'ing Docks. See DOCKS and DOCKYARDS.

Floating Is'lands, accumulations of driftwood and earth on the surface of water, compacted together. The younger Pliny describes floating islands in the Lacus Vadimonis, now Laghetto di Bassano, near Rome, covered with reeds and rushes. On a lake near Gerdauen, in E. Prussia, are such islands large enough to pasture 100 head of cattle; and on one in Lake Kolm, near Osnabrück, are many fine elms. Similar ones have been seen floating 100 m. off the mouth of the Ganges. Remarkable floating islands occur in the Indian archipelago, and they are common on the great rivers of S. America.

Flod'den Field, last point of the Cheviots, the place where King James IV of Scotland, after crossing the Border, August 22, 1513, with an army of over 30,000 men, encountered the Earl of Surrey at the head of an English army of 32,000, September 9th. The battle was stubbornly contested till after nightfall, but resulted in the complete defeat of the Scottish army, with loss of from 5,000 to 12,000 men, including the king and many nobles.

Floods, temporary invasions of the land by bodies of water. Coasts of seas and lakes are sometimes inundated. By the bursting of dams, artificial or natural, the water of reservoirs deluges neighboring valleys. Most rivers, either periodically or occasionally, are so enlarged as to spread beyond their banks. Floods sometimes occur along coasts from the wave accompanying an earthquake. During the Lisbon earthquake of November 1, 1755, a wave cov-

ered the land to a depth of 80 ft., causing great destruction. They are also caused by the storm waves accompanying cyclones. Such was the Backerganj flood from the Bay of Bengal. The delta of the Ganges River was inundated to a depth of 40 ft., and more than 100,000 lives were lost. Floods of this nature, but less intense, occur at rare intervals along the coast of Texas, and sometimes devastate Holland, a great part of which is protected by dikes from the encroachment of the sea. Violent storm winds heap up the sea, which in some cases overtops or breaks the dikes. Floods due to rise of lake level occur only over restricted areas, and are of slight importance. They result from more than the usual amount of rainfall in a season, and occur only on some of the lakes of central Asia.

Inland floods are occasioned also by the bursting of reservoirs, the giving way of embankments, the yielding of ice dams in rivers, and the releasing of glacier lakes. The Johnstown flood of May 31, 1889, in W. Pennsylvania, was an example of the first kind. The breaking of the dam of the S. Fork reservoir precipitated a volume of water 3 m. long, 1 m. wide, and 100 ft. deep on the valley below, destroying everything in its course for a distance of 18 m. and killing 5,000 people. At the breaking up of ice in the spring, river channels sometimes become blocked by the accumulation of ice. The water backs up behind the dam or ice gorge thus created, causing damage above it and also below it when the barrier breaks. Ice-jam or ice-gorge floods may cause great damage in a flat country. A flood of a peculiar kind sometimes arises from an advancing glacier crossing and blocking a stream and creating a glacier lake back of it. This occurs at times in Switzerland, and more frequently in the region of the Himalaya Mountains in NW. India, especially on the tributaries of the Indus.

The most frequently occurring floods are river floods due to overflow of river banks caused by inadequacy of river channel to carry off the rainfall. They are usually the result of a series of moderate rainstorms filling the river channels until there is an overflow. A disastrous but rare species of river flood occurs when a river cuts its banks, taking a new course to the sea. This has occurred on the delta of the Hwang Ho in China on nine occasions in historical times. In 1853 the river broke from its course and entered the Yellow Sea, 350 m. farther N. than formerly, causing enormous loss of life through drowning and starvation. In rivers dominated by the subtropical rains—*i.e.*, receiving little or no rain in summer—the water is low in summer and high in winter. The rivers of Italy and Spain, and those of California and Oregon, are of this class. The latter, however, derive some water from melting snow in the mountains. Rivers of the temperate zone receive their main supply from rains directly, and are high in winter and spring, the seasons of great rainfall. Of this class are the Elbe, Rhine, and Seine of Europe; the Ohio, Arkansas, and Mississippi in the U. S. High water in these is at times made higher by the melting of accumulated snow. The slight evaporation in winter tends to make the water high. Melted snow is relatively more efficient than the same amount of rain in causing a rise, because a much greater part of it goes into the rivers when melted, frozen ground being impermeable to water.

River floods are not without beneficial effects on the land overflowed. The fine silt deposited renders it more fertile. River-bottom or alluvial land is therefore highly prized, but when it has once become occupied by the farmer the flooding which enriched it hinders its utilization. Protection from overflow is commonly sought by embankments called levees. Along the lower course of the Mississippi, below the junction of the Ohio, there is an area of 30,000 sq. m. subject to overflow, and protected by 1,300 m. of levees. The yield of cotton and sugar from this region is large, and when the water breaks over the levees, the damage is great. The whole area is never flooded at the same time. But for the levees a great part of the area would be flooded every year.

Floquet (flō-kā'), **Charles Thomas**, 1828–96; French politician; b. St.-Jean-de-Luz; called to the bar, 1851; 1867, offended Czar Alexander II, when a guest of Napoleon III, by crying, "Vive la Pologne"; so was under the Russian ban (until 1888). In 1871 he became radical member of the National Assembly; 1876, member of the Chamber of Deputies; 1883, Prefect of the Seine; 1885–88–89, President of the Chamber; 1888–89, Prime Minister. July, 1888, he fought a duel with Gen. Boulanger, severely wounding the latter; 1892–93, implicated in the Panama scandals, to the injury of his political standing.

Flo'ra, in mythology, deity of flowers and spring, early worshiped among the Romans; identified with the Grecian Chloris. A temple was vowed to her by Tatius, and a flamen appointed to serve at her altar. It was near the Circus Maximus, and an annual festival was held in her honor between April 28th and May 3d, when licentious extravagances were indulged in. She was represented bearing the cornucopia filled with flowers. Her true name was Melibœa, and she and her brother Amyclas were the only ones of Niobe's children who escaped Apollo's revenge, after which her name was changed to Chloris.

Flora, in botany, the aggregate vegetation of a country or region; thus the "flora of the Black Hills" means the natural vegetation of that portion of the country; just as the animal life of a country is meant when its fauna is spoken of. A catalogue or description of the flora of any country is often called simply the "flora" of the country, as Gray's "Synoptical Flora of N. America."

Flore, Or'der of (so called from Floris, place near Cosenza, the seat of the first abbey), a branch of the Cistercians, including convents of nuns as well as of monks. The order was founded by Joachim of Floris, 1189, and, being suspected of maintaining the heresies of its founder, it never flourished. In 1505 most of

its convents joined the Cistercians and other orders.

Floreal (flō-rā-ăl'), the flowery; eighth month in the republican calendar of France, which from November 24, 1793, to September 9, 1805, was used in place of the Gregorian. Floréal began April 19–22, and ended May 18–21.

Flor'ence of Wor'cester, d. 1118; English chronicler; a learned monk; author of a Latin chronicle, the first written in England after the Norman Conquest.

Florence, city of Tuscany, Italy; 195 m. NW. of Rome, in the valley of the Arno. It is one of the most beautiful cities of Italy, an archbishop's see, and a seat of art and science. Its industries once included manufactures of silk, velvet, and woolen; they are now limited mostly to works of art, mosaic, and jewelry. The inner part of the city was formerly surrounded by a wall, but gardens, palaces, and monasteries now cover the neighboring hills. The river Arno is provided with quays, called *Lungarni*, and with six bridges, which, with the Via della Scala and Via Maggio, form the liveliest parts of the city. Of the twenty public squares, all surrounded by handsome buildings, the most notable is the Piazza della Signoria, very rich in works of art. The old palaces, heavy and massive in architecture, stand among common houses in narrow streets. In the Middle Ages they served as strongholds. One of the most interesting is the Palazzo Vecchio, or Palazzo della Signoria, once the seat of the Florentine magistrature. The Palazzo Pitti, built by Brunelleschi, and a residence of Victor Emmanuel, is one of the most magnificent palaces in existence. It contains the Galleria Pitti, the finest collection of pictures in the world. The Pitti and Uffizi collections are connected by a long gallery, passing over the Ponte Vecchio. Remarkable among the ecclesiastical buildings are the cathedral, the Church of San Giovanni, known as the Duomo or Battistero (Baptistry), with bronze gates by Andrea Pisano and Ghiberti; and the Church of Santa Croce, containing the tombs of Michelangelo, Alfieri, and Machiavelli. Among other notable buildings are the Loggia dei Lanzi, and the Palazzo degli Uffizi, both rich in works of art, and the Bargello or National Museum.

Florence, originally a Roman colony in Etruria, was a flourishing city at the time of Christ. In the beginning of the twelfth century it established a republic, and by the middle of the fourteenth century became, by conquest, the ruler of all Tuscany. In 1378 the famous Medici family became paramount, and ruled till 1494. Under Savonarola a kind of theocracy was then established, which lasted three years (1495–98). The republic was overthrown, 1530, and the Medici restored. From the death of the last Medician grand duke, 1737, Tuscany, whose capital Florence was, came under the control of the Germans, the French, the Germans again, until finally, in 1860, it was incorporated into the kingdom of Italy, Florence becoming the capital of the kingdom; in 1871 this rank was conferred on Rome. Pop. of commune (1901) 205,589.

Florence, Coun'cil of, a continuation, practically, of the Council of Basel; the seventeenth of the twenty Ecumenical Councils recognized by the Church of Rome; convened by Pope Eugenius IV to reunite the E. and W. churches. It first met in Ferrara, January 10, 1438, but, a plague having broken out, it was transferred to Florence. A doctrinal agreement was reached and proclaimed in the presence of the Greek emperor and his prelates, July 6, 1439, but the sessions continued till April 26, 1442. The "reconciliation" had no root in the hearts of the people, and in 1443 the patriarchs of Alexandria, Antioch, and Jerusalem united in denouncing the Council of Florence. Meanwhile the remnant of the council summoned by Eugenius IV continued to sit at Basel; in 1440 it elected an antipope (Felix V), who resigned in 1449. It removed to Lausanne, July 24, 1448, and dissolved, May 25, 1449.

Flor'entine Acad'emy, learned association of Florence, founded 1540; famous as successor of the Accademia della Crusca. See DELLA CRUSCA.

Florentine School of Paint'ing, an Italian school which reached its highest excellence in the fourteenth and fifteenth centuries, and by its teaching exercised great influence on art. Of the Florentines, Masaccio (1402–28) made wonderful advances in naturalistic power, both in drawing and in conception and composition, while the ecclesiastical and decorative style was maintained by Fra Angelico da Fiesole (1387–1455). The work of Ghirlandajo (1449–94), Filippo and Filippino Lippi (1412–69 and 1457–1504), able men and delightful artists, seems more realistic and vigorous than Fra Angelico's; Sandro Botticelli (1474–1515) is one of the original designers of any period. Andrea del Sarto (1487–1531) seems to close the list of the great Florentine school, except that Michelangelo (1475–1564) prolongs its celebrity in other cities and under other influences. The Venetian school excelled the Florentine in richness of color, but the latter stands unrivaled among Italian schools for the decorative quality of its painting.

Flores (flō'rĕs), extreme W. island of the Azores; in the Atlantic; area, 54 sq. m.; named by the Portuguese in allusion to the flowers with which it was covered; chief town, Santa Cruz. Pop. abt. 9,000. FLORES is also the name of an island of the Malay Archipelago, and the largest of the chain that extends from Java to Timor; length, 230 m.; breadth, 35 m.; area, 8,900 sq. m.; is hilly, with some lofty volcanic peaks; exports sandalwood, beeswax, and horses; aborigines are Papuans, but the Malays outnumber them by far. Pop. est. at 250,000.

Florian (flō-rē-ăn'), **Jean Pierre Claris de,** 1755–94; French author; b. Château de Florian, Gard; entered the service of the Duc de Penthièvre; patronized by Voltaire, he wrote fables, romances, comedies, and pastoral

poems; was imprisoned in Paris by the republicans, and d. at Sceaux. Some of his plays still keep the stage, but his romances, "Galatée" and "Estelle," his "Fables," and his translation of "Don Quixote" are his best works.

Florian (flō'rĭ-ăn), **Saint**, patron saint of Poland; b. Noricum; a Roman soldier of Christian parentage; was drowned in the Enns River in Austria during the Diocletian persecution, for his voluntary confession of the Christian faith; buried about 3 m. from Enns, but his relics were transferred to Rome, and, 1183, to Cracow. In legendary lore he is honored as the extinguisher of conflagrations; festival, May 4th.

Flor'ida, so called from its discovery by Spaniards on Easter Day (Spanish name, "Pasqua Florida," meaning the Feast of Flowers); popularly called the EVERGLADE or the GULF STATE; one of the S. Atlantic states; bounded by Georgia and Alabama, the Atlantic, the Gulf of Mexico and Straits of Florida; greatest length, 450 m.; area, 58,680 sq. m.; pop. (1905) 614,845. The surface is level along the E. coast, but rises gradually to a central ridge of 280 ft.; W. coast low; S. part of the peninsula occupied by the Everglades; extensive swamps are a feature, Okefenoke being the largest inland one. Almost the



entire shore of the mainland is separated from the ocean by sand bars. The islands S. of the peninsula are known as the Florida Keys. Okechobee, 1,250 sq. m., is the largest of many lakes; springs are numerous, some of them bursting from the earth as navigable streams; the St. Johns, along the Atlantic coast, the Withlacoochee, along the Gulf coast, and the Kissimmee, running into Lake Okechobee and the Gulf, are the principal rivers of E. Florida; of W. Florida are the Suwannee, Apalachicola, and Chattahoochee, all navigable.

The mineral products are phosphate rock, lime phosphates, shell and coral limestone, and pottery clay; principal forest growths, long-leaved pine, cypress, juniper or red cedar, live oak, hickory, palmetto, and cabbage palmetto. The climate is very uniform; extreme range of temperature in N. Florida, 90° to 26° F.; in central and S. Florida, 90° to 43° F., summer average nowhere exceeding 84° F.; annual average rainfall at Jacksonville, 54.70 in.; at Pensacola, 67.31 in. Cotton, tobacco, rice, Indian corn, sugar cane, peanuts and sweet potatoes, oranges and other citrus fruits, pineapples, guavas, figs, cocoa palms, olives, etc., are cultivated; cattle raising is important. The chief manufactures are of lumber, naval stores, cigars, textile goods from palmetto fiber, cotton-seed oil and cake, and "koonti" or "coontie," a flour made from the root of a wild plant. Sponge fishing is carried on from Cedar Keys to Biscayne Bay.

Florida was discovered by Juan Ponce de Leon, 1512. A Huguenot colony established itself on the coast below St. Augustine, 1563–64, but was exterminated by the Spaniards, 1565, when St. Augustine was founded. Spain held the country until 1763, when it was ceded to England in exchange for Cuba. The British divided the territory into two provinces, E. Florida and W. Florida, and receded it to Spain, 1783. W. Florida was sold to France, 1795. In 1811 the U. S. resolved to seize Florida in order to prevent the British from taking possession. November, 1814, it was captured by Gen. Andrew Jackson. Then followed a long series of wars with the native tribes, and, 1819, the whole of Florida was ceded by Spain to the U. S. The territorial government was organized, 1822; war with the Seminole Indians was waged, 1835–42; admission to the Union was granted, 1845; an ordinance of secession was passed, January 10, 1861; readmission to the union was obtained, 1868.

Florida Blanca (flō-rē'dä blän'kä), **José Moñino** (Count of), 1728–1808; Spanish statesman; b. Murcia; was fiscal to the tribunal of the Council of Castile, and then Ambassador to Rome. In 1777 he became Premier; in his administration of fifteen years he built roads, canals, bridges, and conduits, created more than sixty agricultural societies and many philanthropic institutions, made important treaties, and introduced judicial reforms. In 1808 he was made president of the Central Junta, but soon sank under his duties. He published works on political economy.

Flor'ida Keys, series of islands, of coral formation, extending in the form of a crescent 220 m. SW. along the S. coast of Florida, beginning near Cape Florida, and ending in the Dry Tortugas; Cayo Largo (Long Key) is the largest, and Key West the most important. See KEY WEST.

Flor'in, gold coin first issued in Florence in the eleventh century, of about the value of a ducat, having a lily figured on the obverse and John the Baptist on the reverse. It was soon imitated elsewhere. "Florin" is now the name of various gold and silver coins in Europe.

Flori'nus, Roman presbyter and heresiarch in the latter half of the second century, deposed by Eleutherius. His heresy was a form of Gnosticism, essentially like that taught by Valentinus.

Flo'rio, John, abt. 1552–1625; English philologist and grammarian; b. London of Italian

parents, who, as Waldenses, had sought refuge from persecution; resided at Oxford, and, 1578, published his "First Fruits which Yield Familiar Speech, Merry Proverbs, Witty Sentences and Golden Sayings," which was accompanied by "A Perfect Induction to the Italian and English Tongues." This was followed by a similar work in 1591, and by an Italian and English dictionary in 1598 under the title of "A World of Words." He enjoyed the patronage of several persons of high rank, and, after the accession of James I, was instructor to the young prince. He is best known for his English translation of Montaigne's "Essays," published in 1603.

Flo'ris, Frans, 1520–70; Flemish painter, real name DE VRIENDT; b. Antwerp; established a school there; was a prolific worker, though a man of dissolute life. His masterpiece, "The Fall of the Rebel Angels," is in the Louvre.

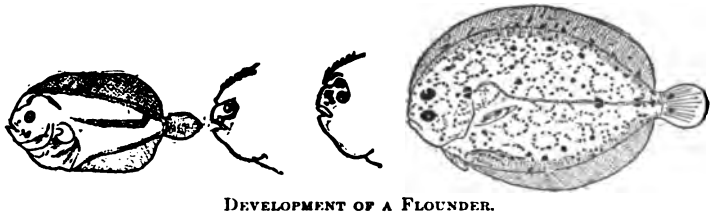
Flo'rus, Lucius Annæus, Roman historian under the emperors Trajan and Hadrian; wrote an epitome of Roman history from the beginning to the closing of the temple of Janus by Augustus.

Floss Silk, soft, downy part of the silk which remains on the cocoon after all that can be reeled off has been reeled off. It is steeped in water, pressed, dried, oiled, carded, and spun into soft, loose yarn, used in embroidery.

Flo'tow, Friedrich Ferdinand Adolph von, 1812–83; German composer; b. Teutendorf, Mecklenburg-Schwerin; passed most of his life in Paris. His operas have been popular for their light, pleasing music. They comprise "Le Naufrage de la Méduse," "Forestier," "L'Esclave de Camoëns," "Alessandro Stradella," "L'Âme en Peine," "Albin," "Martha," "Zilda," and "L'Ombre." "Martha" is everywhere the most popular.

Flot'sam, word used with jetsam and ligan to designate different kinds of wrecked goods. Goods flotsam were goods that floated away when a ship was wrecked. Goods jetsam were those cast over from a ship in peril. Goods ligan were goods cast out, but, because they would sink, tied to some object which would hold them afloat.

Floun'der, any one of various marine fishes of the family *Pleuronectidæ*. They are flat, and swim with one side, not one edge, uppermost; both eyes are on the upper side, and the lower side is much whiter than the other. Many species occur in American waters.



DEVELOPMENT OF A FLOUNDER.

Flour, finely ground meal of wheat or other grain; especially the finer part of meal, separated by bolting or sifting. When dry wheat is crushed, the product is a powder mixed with scales, known as whole meal. Sifting or bolting separates the whole meal into two portions, known as flour and bran. The latter consists of the outer woody portion of the grain, with adhering portions of the interior; the remainder is flour. The term flour applies as well to rye, and more or less to other grains, and to some extent to seeds. It was at one time customary in the U. S. to divide the product into three grades—flour, connell, and bran. The flour, amounting to some seventy per cent, was removed by bolting; and the remainder, by passing over a coarser sieve, was divided into larger scales and fragments called bran, and lesser scales and fragments called "connell" or "middlings." The presence of minute particles of woody fiber in the flour gives to it a yellow shade. That system of milling which most nearly removes all the woody fiber and none of the gluten or phosphates from the flour accomplishes one of the chief ends to be gained.

The leading features of the Hungarian roller system are: (1) Systematic separation, scouring, and brushing of the wheat; (2) wheat granulation by grooved chilled-iron rollers, employing at least five breaks, and rolls having from eight to thirty grooves to the inch, making but little flour and leaving the bran finished; (3) separation of the light chaff from the breaks by aspirators (blowers); (4) thorough and systematic grading and purifying the middlings by purifiers; (5) sizing the large middlings by equally speeded, smooth, chilled-iron rolls, thus reducing their size and taking out germs and bran specks; (6) reducing the fine clean middlings to flour by differentially speeded rollers; (7) complete bolting or sifting after each of the above. The present methods of milling in the U. S. are identical with the Hungarian process, except that in the U. S. manual labor is minimized, and machinery is employed so fully in all stages that the mill is practically automatic. The mills of the U. S. generally make three principal grades of flour —patent or middlings flour, bakers' or break flour, and low-grade or bran flour. Of flour from ordinary wheat, 72 to 76 per cent is middlings, 18 to 22 per cent bakers', 4 to 7 per cent low grade. From 100 lbs. of good wheat there is produced 76 lbs. of flour of all grades, 24 lbs. being bran, shorts, and waste. To make a barrel of flour, 258 lbs. of clean wheat are required. The U. S. census of 1900 reported 10,051 flour and grist mills in operation, having a combined capital of $265,117,434, employing 39,110 wage earners, paying $619,971,161 for materials, and yielding products valued at $713,033,395. See WHEAT.

Flourens (flō-răn'), **Gustav,** 1838–71; French *littérateur* and politician; son of Marie Jean Pierre; b. Paris; became Deputy Prof., College of France, 1863; fought in Crete against

the Turks, and was Minister Plenipotentiary from Crete to the Greek Govt., 1865–68; took part in electoral movement at Paris, 1868; was arrested, 1869, and same year wounded in a duel with Paul de Cassagnac; took part in the communal insurrection, 1871, and killed near Paris. Was author of "Discours du Suffrage Universel," "La Question d'Orient et l'Insurrection Crétoise," "Paris Delivrée," etc.

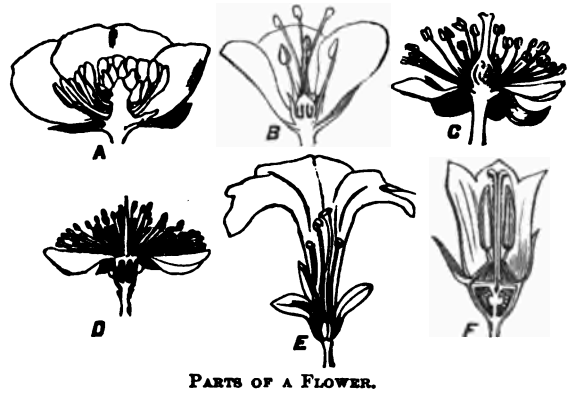
Flourens, Marie Jean Pierre, 1794–1867; French physiologist and author; b. Maureilhan; M.D., 1813, and a resident of Paris, 1814; admitted to the Academy of Sciences, 1828; Prof. of Comparative Anatomy, 1832; perpetual secretary of the Academy of Sciences, 1833; member of French Academy, 1840; peer of France, 1846. Wrote on the works of Cuvier and Buffon, and on the nervous system and comparative physiology.

Flow'er, Sir William Henry, 1831–99; English anatomist; b. Stratford-on-Avon; assistant surgeon, Sixty-third Regiment in Crimean War, 1854–55; assistant surgeon and demonstrator of anatomy, Middlesex Hospital, London, 1858–61; conservator, Museum of the Royal College of Surgeons of England, 1861–86; Hunterian Prof. of Comparative Anatomy and Physiology, 1870–86. Was director of the natural history departments, British Museum, after 1885; president of the Zoölogical Society of London after 1879; of the British Association for the Advancement of Science, 1889, and of the Museums Association. Author of numerous books, memoirs, and lectures on anatomical, zoölogical, and anthropological subjects.

Flower, aggregation of reproductive organs and accessory parts in the highest division of the vegetable kingdom (*Spermatophytes*). In its derivation it is a shoot with short stem and leaves, more or less modified for reproduction. Thus there are usually one or more whorls of green or colored leaves (the perianth), which may often be distinguished into an outer whorl (the calyx, composed of sepals commonly of a green color) and an inner whorl (the corolla, composed of petals, white, red, yellow, blue, etc.). Within or above the calyx and corolla are found one or more whorls of slender pollen-bearing leaves (the stamens), and within or above these one or more seed-bearing leaves (the pistils). In the simpler flowers these parts are all present in the order given, and are separate. (See A in figure.)

There are, however, many modifications of this simple type. On the one hand, the parts become more and more united (B to F), while they may also become more irregular in size and shape, and every part may show wide departure in size, shape, and texture from the original type. On the other hand, there have been considerable variations by omission of one or more parts, sometimes reducing to a single organ, as in the willows, where some flowers are reduced to a pistil only. The purpose of the flower is the production of new plants, *i.e.*, of perfect seeds, to that end. To produce a new plant the contents of a pollen cell must unite with an egg cell in the ovule. This can be accomplished only when the pollen cell has been placed upon the stigma; there it germinates into a tube which, penetrating the style, reaches the egg cell of the ovule where the two protoplasms, *i.e.*, the materials of pollen cell and egg cell, unite.

Floriculture is an important industry in the U. S., and no rural pursuit offers greater attractions, whether in the business itself or in its pecuniary rewards. The business branches into two: growing plants for planting, which belongs to the nursery trade, and growing cut flowers and plants for decoration, which forms the main business of florists. The U. S. census states that "of the plants sold, the demand in the N. and E. U. S. is greatest for geraniums, coleus, roses, pansies, verbenas, heliotrope, carnations, chrysanthemums, palms, ferns, and fuchsias, nearly in the order named. In the S. U. S. the demand is for roses, chrysanthemums, geraniums, coleus, palms, and ferns; while California shows the demand to be largest for roses, carnations, chrysanthemums, geraniums, palms, and pansies. For cut flowers, roses lead, followed closely by carnations." Besides the capital invested in commercial floriculture, there is a large interest in amateur flower growing, and it is safe to say that no other avocation attracts so many people. Amateur gardening is most conspicuous, as a rule, in the E. states, but almost every village in the land affords some example of amateur devotion to floriculture. See BOTANY.



PARTS OF A FLOWER.

Flowers, Artifi'cial, imitations of natural flowers and foliage, in various materials, and used for personal adornment or for decoration of a hall, a table, etc. This art is very old. Flowers and leaves of painted linen have been found in tombs at Thebes, and the Egyptians also invented flowers of horn shavings stained in colors. From remote times the Chinese have made artificial flowers of the pith of bamboo. In Rome, Crassus was the first who had them made of gold and silver. During the Middle Ages they were much used, not only in the Roman Catholic Church and as symbols, but

also at secular festivals and as ornaments. They were generally made of paper, satin, silk, metal, and wax, Italy producing the finest. In 1728, Seguin, a botanist and chemist in Paris, employed parchment for the flowers, and bristles of the wild boar for their stems, and his imitations were so successful as to arouse the jealousy of the painters. The manufacture steadily increased and developed in France, which still stands at the head of this industry. Harvard Univ. possesses a unique collection of flowers, made entirely of glass, illustrating chiefly the flora of the U. S.

Flowers, Sym'bolism of, imaginative significance attached to flowers by tradition and custom. From earliest times flowers have been employed by individuals and nations as symbols of human emotions and of natural phenomena. The Bible alludes to flowers as symbols of purity, joy, beauty, etc. China is supposed to have made, in its early history, a complete floral alphabet, and even now it employs flowers so lavishly in its public and private life as to be called the "Flowery Kingdom." In India, as in Egypt, the lotus was a sacred flower, and Brahma is said to have been born in its bosom. Greece perpetuated floral symbolism by crowning the victor of a public game with a wreath of leaves. The Roman soldiers' greatest victory was the winning of a crown of oak leaves. Poets of all nations have made use of floral symbolism; it was a feature of chivalry, and in tournaments a single flower was often the badge presented by a lady to her particular knight or champion. Flowers still have their significance: the forget-me-not, for example, symbolizes true love; the lily of the valley, purity; the pansy, thought; the narcissus, self-admiration; the rose, love and beauty; the violet, modesty, etc. Orange blossome have become the emblem of a bride; the finding of a four-leaf clover in America, or white heather in Europe, betokens good luck; fate is determined more or less by the plucking out of a daisy's petals, etc.

Many Oriental and European nations have adopted a national flower. In Japan it is the chrysanthemum; in England, the rose; in France, the lily. In the U. S. an attempt was made, 1889, to establish a national flower; the golden-rod received the majority of votes, but as a national emblem is established by tradition and custom rather than by popular vote, the U. S. cannot be said to have a national flower. The state flowers adopted by legislative act, chosen by vote of school children or otherwise popularly recognized, are as follows:

Alabama	Golden-rod
Arkansas	Apple Blossom
California	California Poppy (Eschscholtzia)
Colorado	Columbine
Connecticut	Mountain Laurel
Delaware	Peach Blossom
Georgia	Cherokee Rose
Idaho	Syringa
Illinois	Violet
Indiana	Corn
Iowa	Wild Rose
Kansas	Sunflower
Louisiana	Magnolia
Maine	Pine Cone and Tassel
Maryland	Golden-rod
Michigan	Apple Blossom
Minnesota	Moccasin Flower
Mississippi	Magnolia
Missouri	Golden-rod
Montana	Bitter Root
Nevada	Sage Brush
Nebraska	Golden-rod
New York	Golden-rod
North Dakota	Wild Rose
Ohio	Carnation
Oklahoma	Crimson Rambler
Oregon	Golden-rod
Rhode Island	Violet
South Dakota	Anemone
Texas	Blue Bonnet
Utah	Sego Lily
Vermont	Red Clover
Washington	Rhododendron
West Virginia	Rhododendron

Floyd, John Buchanan, 1805–63; American military officer; b. Montgomery (now Pulaski) Co., Va.; member of the Virginia Legislature, 1847–49; Governor, 1850–53; Secretary of War under President Buchanan from 1857 to December, 1860, when he resigned. He had previously dispersed the army, in the interest of the secession movement, to remote parts of the country, and transferred many arms from N. to S. arsenals. In the winter of 1860–61 he was indicted as being privy to the abstraction of $870,000 in government bonds, but failed to appear for trial. He became a brigadier general in the Confederate army, commanded in W. Virginia, was defeated by Gen. Cox at Gauley bridge; commanded a brigade at Fort Donelson, and on the night before the surrender he, with Gen. Pillow and about 2,000 men, escaped into Tennessee, leaving Gen. Simon B. Buckner to surrender.

Floyd, William, 1734–1821; signer of the Declaration of Independence; b. Brookhaven, N. Y.; on outbreak of the Revolution appointed to command Suffolk Co. Was a delegate to the first Continental Congress; elected to the general Colonial Congress, and remained a member eight years; in 1777, chosen State Senator of New York, retaining his seat in Congress. Was a member of the first Congress under the Constitution.

Flüelen (flü'ĕ-lĕn), or **Flühlen** (flü'lĕn), village of Switzerland; canton of Uri; on the S. arm of Lake Lucerne; 2 m. N. of Altorf; has a chapel erected in 1388 to the memory of William Tell, which is visited by many persons in Ascension week. According to one version of the legend, the chapel is on the spot where Tell jumped to the shore, thrusting the boat, with the crew and Gessler, back into the surf. There are other points along the shore for which the same claim is made.

Flügel (flü'gĕl), **Gustav Leberecht,** 1802–70; German Orientalist; b. Bautzen; was Prof. at Meissen, 1832–50; edited Hadji Khalfa's encyclopedic lexicon in Arabic, with Latin translation and commentary, and an edition of the Koran, etc.

Flügel, Johann Gottfried, 1788–1855; German lexicographer; b. Barby; spent nine years in the U. S.; was Prof. of English in Leipzig, 1824–38, then U. S. consul there. Published, besides other works, a "Merchants' Dictionary, in German, English, and French," but is best known by his "Complete English-German and German-English Dictionary."

Fluke, or **Fluke'worm,** common name of members of the trematode genus *Distomum,* and more especially to the liver fluke of the sheep. The presence of these parasites in the liver causes the disease commonly known as "sheep rot" and "liver rot," rare in the U. S. In 1879–80 it caused the death of over 3,000,000 sheep in the British kingdom. Several varieties of fluke infest the biliary ducts in man, especially in Japan. Another form is found in the blood of man. In Japan and China there is a form of Distoma which infests the bronchial tubes, and leads to hemorrhage from the lungs and to chronic cough.

Flume, The, cleft between two walls of rock in the Franconia Mountains; in the town of Lincoln, Grafton Co., N. H. A small stream flows through it, and just below falls over 600 ft. in a cascade. The Flume is a favorite resort of tourists in the White Mountain region.

Fluorescence (flū-ō-rĕs'sĕns), an action of certain substances upon light by which they absorb light energy of shorter period or wave length, and reëmit it in waves of greater length, thus under certain conditions appearing self-luminous with brilliant and various colors.

For illustration: On the surface of water in a clear glass jar let fall a few particles of the coal-tar color known as fluoresceïn. As the particles of this brick-red powder slowly dissolve, rootlike filaments of intense green color will descend into the water, soon producing the appearance of a bunch of delicate seaweed. Place the vessel between the eye and the source of light, and these opaque green filaments will appear perfectly transparent, and of a reddish-orange color. The reason of these appearances is that the light of shorter wave length (*i.e.,* the blue and violet and even invisible rays) is absorbed by the solution and reëmitted in longer waves, has a resultant or residual color effect of reddish orange. In all fluorescent liquids and some solids the duration of the fluorescent emission after the exciting light is cut off is inappreciable, but in most solids it has a finite duration varying from a thousandth of a second in some to many minutes in others. This persistent fluorescence is sometimes distinguished as phosphorescence. This prolongation of the fluorescent action can be given to some solutions by solidifying them by combination with gelatin.

Fluorine (flū'ŏr-ĭn), gaseous element, greenish yellow and very poisonous; its symbol is F; atomic weight, 19. It is found in the teeth and bones of animals, in sea and some mineral waters, and in many phosphates and other minerals. Combined with hydrogen it forms hydrofluoric acid, which rapidly corrodes glass; and so is used in etching on glass. Fluorine was first isolated, *i.e.,* obtained "free" or uncombined, in 1886. It is the most active of all the elements at ordinary temperatures. It decomposes water, combines with sulphur, iron, etc., but does not act on platinum, and is the only element that will not combine with oxygen. Is an ingredient of fluorite.

Flu'orite, Flu'or Spar, or **Fluor,** mineral consisting of fluorine and calcium; crystallizes in the monometric system (cubes, octahedra, etc.), and has a perfect octahedral cleavage, *i.e.,* where split the new surface has eight facets. Its hardness is 4, and its specific gravity 3.18. It often occurs perfectly crystallized, and of beautiful and bright colors; pulverized, it becomes below a red heat brilliantly phosphorescent. It is sometimes carved into ornaments, and is used as a source of hydrofluoric acid for etching, and as a flux (solvent or liquefier) in smelting certain ores.

Flush'ing (Dutch VLISSINGEN), strongly fortified seaport of the Netherlands; province of Zealand; on the island of Walcheren, at the mouth of the W. Scheldt; connection with the ports of Rammekens and Breskens, commands the entrance of the Scheldt; its harbor, accessible to the largest vessels, is one of the safest and most commodious of Europe; it has extensive dockyards and a floating dock. The chief exports are wheat, beans, fish, and cattle; chief imports, coal from England, and coffee, tea, and tin from Java; chief manufactures, oil and soap. Pop. (1900) 8,893.

Flute, tubular wind instrument of very ancient origin; is used in every part of the world, and has always had two principal forms. One of these is held straight before the performer, who blows into the end of the tube; the other is closed at one end, held sideways, and blown into through a hole in the side. This latter has been known as the German flute; from the former the flageolet has been derived. The German flute alone has been found worthy of orchestral and solo use. Since abt. 1830 the flute has undergone many changes and improvements; more than any other instrument. The bore has been altered, and the fingering, number, and disposition of the keys have been changed to the system of Boehm.

Flux, substance used to promote the fusion of bodies. Limestone (carbonate of lime) is the usual flux for ores of iron in the blast furnace; it unites with the alumina (clayey matter) and silica (sand) of the ore, forming a fusible "slag." To flux silica and silicates, alkaline or "basic" fluxes are selected, as carbonate of soda or potassa, litharge, lime, or carbonate of lime; fluor spar is very effective. For lime, alumina, oxide of iron, etc., acid fluxes are selected, as borax, silica, glass, etc. Niter (which is made up of potassium, nitrogen, oxygen) and litharge (lead and oxygen) are both oxidizing agents and fluxes (an oxidizing agent is a giver of oxygen—an oxide maker). Cyanide of potassium is a reducing agent as well as a flux; it reduces metals, *i.e.,* frees them from oxygen or sulphur.

White flux is a mixture of carbonate, nitrite, and nitrate of potassium, prepared by putting a mixture of equal parts of niter and argol (crude cream of tartar) into a hot crucible in successive small portions. It is an oxidizing flux. Black flux is prepared of the same materials and in the same manner as white flux, but with double the quantity of argol. As this proportion of niter is not sufficient completely to oxidize the carbon of the argol, the resulting mixture contains only carbon and potash (car-

bonate of potassium). It consequently reduces metallic oxides by the union of the carbon with the oxygen. Morveau's reducing flux is composed of sixteen parts of window glass, two of calcined borax, and one of charcoal.

Fly, any one of the two-winged insects of Diptera. The common house flies (*Musca domestica*) lay their eggs in horse manure; hence near stables they are found in great numbers, as a fly lays over 100 eggs, which are hatched and mature in ten days. The fleshfly, or blowfly, *Sarcophaga carnaria,* lays its eggs in meat



HOUSE FLY.

of all kinds. The horseflies belong to the genus *Tabanus,* the botflies to *Œstrus* and *Hippobosca.* The Hessian fly is not a true fly, but a hemipterous insect. Many species of flies are beneficial, as they remove noxious matter. But the house fly is a great carrier of disease, especially typhoid fever, and, in some countries, ophthalmia; all food should be carefully screened to prevent contamination. See DIPTERA.

Fly'catcher, popular name of many dentirostral or tooth-billed birds, of the order *Passeres* and subfamily *Muscicapinæ.* There is prob-



THE KING OF THE FLYCATCHERS.

ably no family of birds about which systematic writers on ornithology differ more than on that of the flycatchers. They are active and fearless, and very beneficial to man by destroying flies, moths, and various insects and grubs injurious to vegetation and to animals. The kingbird is probably the best-known flycatcher in the U. S., where the tyrant birds (*Tyrannidæ*), though not of the same family, are also known as flycatchers.

Fly'ing Drag'on, or Flying Liz'ard, lizards of the genus *Draco,* and closely allied genera of the family *Agamidæ.* These have ribs projecting outside the trunk and bearing side expansions of membrane which serve as parachutes. The type of the group is *D. volans* of the Indian Archipelago. The term flying dragon, in addition to its mythological application, has sometimes been applied to the extinct *Pterodactylus.*

Flying Dutch'man, a spectral ship said to be seen off the Cape of Good Hope, and reputed to be commanded by Van Straaten, a Dutch captain condemned for blasphemy or other crimes to beat about the seas until Judgment Day. In Wagner's opera, "Der Fliegende Holländer," the captain is named Vanderdecken, and he is absolved from his penance by the self-sacrificing love of a maiden whom he has met upon one of his periodical visits on shore. There are many such legends of ghostly ships about the equator and in the North Sea.

Flying Fish, genus belonging to the order *Pharyngognathi,* family *Scomberesocidæ,* containing thirty-three species. This genus has large pectoral (fore) fins, used as parachutes, and to a certain extent as wings, approaching much nearer true flight than does the flying



EUROPEAN FLYING FISH.

dragon or the flying squirrel. The characters of the long pectorals, the strength of their muscles, and the size of the bony arch to which they are attached, are the essential conditions of their flight. The common flying fish of the Mediterranean (*Exocœtus volitans*) is rarely more than 16 in. long. There are five species on the coast of N. America.

Flying Le'mur, Colu'go, or Cat Mon'key, common name of animals of the family *Galeopithecidæ,* sometimes elevated into the order *Pteropleura* or *Dermoptera,* forming the connecting link between monkeys and bats. They are nocturnal, passing the day suspended from trees by the hind claws; are active at night, climb-

ing with facility, and springing from tree to tree for a distance of 100 yards; the females carry the young in the fold of abdominal skin



FLYING LEMUR.

when traveling among the trees; their food consists of fruits, insects, small birds, and eggs. All the species live in the E. Indian archipelago.

Flying Ma'chines, machines or apparatus that navigate the air, sustained by wings or propellers, and unaided by gas or buoyant chamber of any kind. They are classified as orthopters, helicopters, and aëroplanes. Orthopters are sustained and propelled by flapping wings; helicopters by vertical aërial screw propellers; aëroplanes by a combination of rigid gliding wings and horizontal screws. All three types have worked successfully in small models. Only aëroplanes, as yet, have proved successful man carriers. Of these, the two types most in use are the monoplane and the biplane, the latter having two superposed wing surfaces, like a box kite, the former having a single tier of wings, like the dragon fly or a bird. Commonly, aëroplanes are driven by a light gasoline engine, actuating one or two horizontal screw propellers; but they may also travel without propelling mechanism, as when they glide gently downward, by the force of gravity, or ascend by virtue of acquired momentum or a favorable wind.

The MONOPLANE type began its growth, in model form, practically with the experiments of Sir George Cayley in 1809, and ended with those of S. P. Langley in 1903. Cayley constructed bird-shaped gliders which coasted down the air in good balance, and alighted at a predetermined place, according to the set of the tail, or rudder. He also proposed adding an engine, but could not find or devise one sufficiently light.

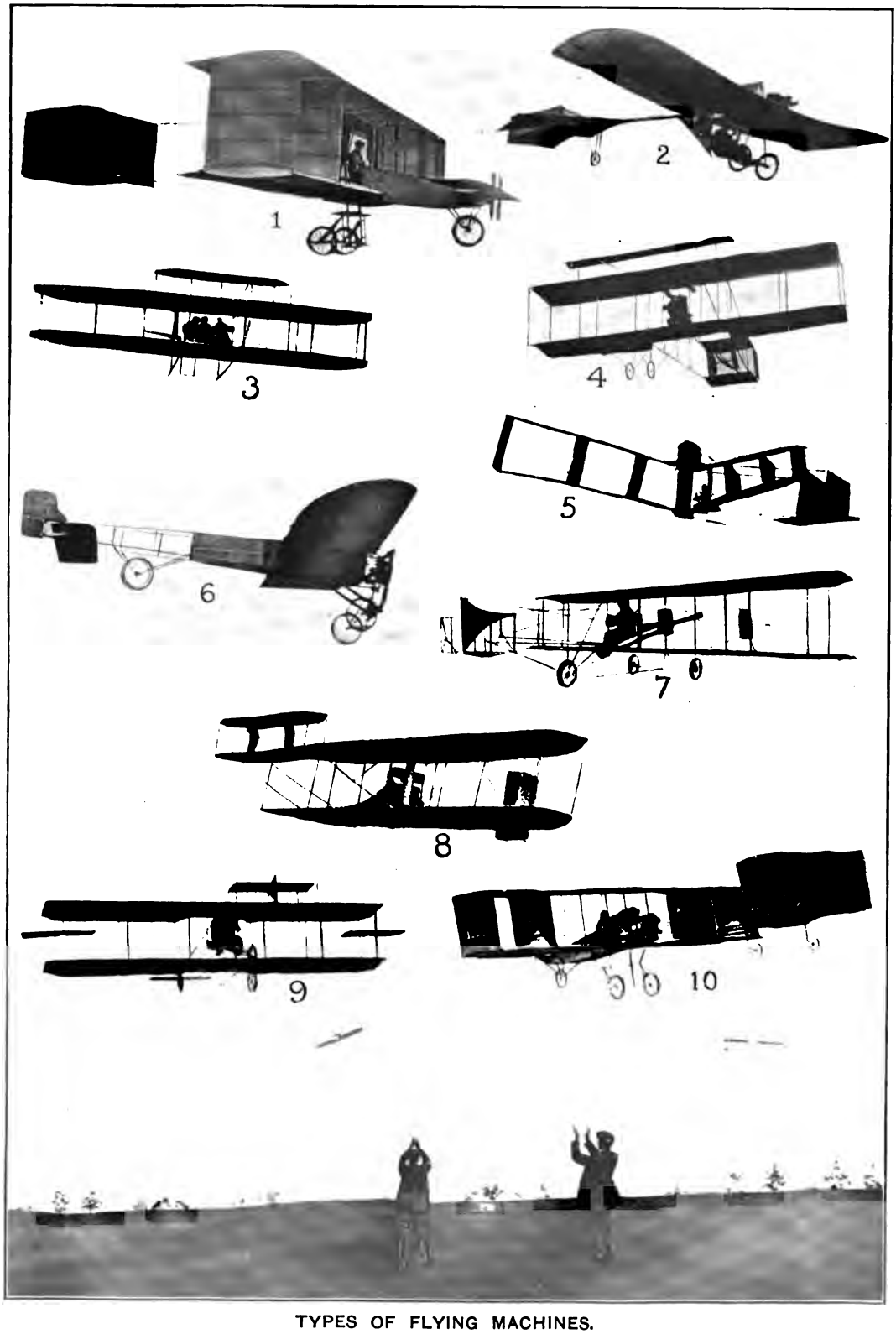
In 1842 Mr. Henson invented and patented, in England, the first aëroplane designed to carry passengers. It was a monoplane driven by a steam engine, actuating twin screw propellers, provided with a keel and double rudder for controlling its flight, and with wheels for launching and alighting. It met with but meager success. In 1846 Stringfellow built a steam monoplane about the size of an eagle, having wings slightly concave and tapering to the rear like a bird. With full steam pressure and twin propellers whirling this model ran along a monorail, or stretched wire, then lifted into the air, and flew 40 yds. This was the first successful power-driven aëroplane model.

In 1890 Clement Ader made the first successful flight of a man in a power-driven machine—a monoplane, having wings like a bird, mounted on wheels, and propelled by a steam engine actuating twin screws in front of the wings. His first machine, called *Eole*, was 21 ft. long, spread 46 ft., and weighed 1,100 lb. Mounted by Ader, it sped quickly over the ground, rose into the air, and flew 150 ft. His next monoplane, *Eole No. 2*, was launched several times, and on one occasion flew 300 ft. He built a third monoplane for the French War Department. This was officially tested on a windy day—October 14, 1897—and carried Ader over a circular course, but was injured on landing. The experiments were now discontinued, as no further funds were allowed.

Lawrence Hargrave, in 1891, built a compressed-air monoplane driven by a single screw. It spread 20 sq. ft., weighed about 3 lb., and flew 128 ft. in eight seconds, carrying 90 lb. per horse power. Two years later he made a steam engine weighing 10.7 lb. per horse power, and capable of driving the model about 2 m. He also invented the Hargrave box kite —now the basic feature of some aëroplanes.

Dr. S. P. Langley, after making many toy aëroplanes driven by rubber springs, launched, in 1896, a steam monoplane shaped like a huge dragon fly, having one pair of wings fore, another pair aft, all trussed rigidly by steel tubing stiffened by wire. It was a tandem monoplane, with twin screws amidships, driven by a light steam engine, and controlled in flight by a double rudder. Like the models made by Cayley and others, its wings were higher at the tips, to ensure lateral stability in moderate weather. It measured 13 ft. across, 16 ft. along its entire length, and weighed, with motor and propellers, nearly 30 lb. It was launched from the top of a house boat on the Potomac River. From this it was shot forth by a spring catapult, with engine and propellers running at full speed. It balanced nicely and flew three quarters of a mile with its slight charge of fuel, though it could have carried enough fuel to fly several miles. In 1903 a larger model, of similar plan but driven by a gasoline engine, was launched and flew beautifully. This was followed by a man-carrying tandem monoplane, like the last model. The large machine carried a 52-horse-power, 5-cylinder, radial gasoline motor weighing 200 lb., with accessories. On its trial trip the machine caught on the launching track and plunged into the water. A subsequent launching was equally unfortunate. The experiments, which had been ordered by the U. S. Ordnance Department, were now abandoned.

In 1907 Louis Bleriot built a tandem monoplane of Langley's type, in which he flew 600 ft. at a height of 50 ft. A later model flew



TYPES OF FLYING MACHINES.

1. VOISIN
2. LATHAM
3. WRIGHT
4. SOMMER
5. DUMONT
6. BLÉRIOT
7. FARMAN
8. LAMBERT
9. CURTISS
10. PAULHAN

more than 3 m. at the rate of 52 m. an hour, executing turns safely, steadied by torsional wing tips. On October 31, 1908, he flew from Toury to Areteney and return, a total distance of 17 m. On July 25th he flew across the English Channel, from near Calais to Dover, where he landed safely. His recent monoplanes have a pair of large front wings, combined with a rudder whose plane is vertical, the front and rear being connected by a trussed framework, mounted on bicycle wheels and carrying the pilot's seat, with controlling levers; carrying also the gasoline motor actuating a single-screw propeller projecting from the front of the frame. A single controlling lever rotates the vertical rudder for flying right and left, the horizontal rudder for rising and descending, and rotates the wing tips, or in some types the wings themselves, to make the aëroplane turn about its longitudinal axis, or to prevent such turning, if desired. Many other inventors contemporaneous with Bleriot developed monoplanes which are now in common use, the most successful being the *Antoinette*. The most important modern features of these aëroplanes, as of the biplanes, are the light gasoline motor and the torsional wing for controlling the lateral equilibrium by the impact of the air. The principle of the torsion wing was first made public in 1893, by Dr. A. F. Zahm, who also described an aëroplane with flexible or rotating wings, embodying that important principle.

The BIPLANE type is due primarily to F. H. Wenham, who in 1866 patented an aëroplane containing several superposed surfaces, so as to secure extensive lifting area, without great length of wing, but who did not push the plans to practical success. In 1868 Stringfellow built a small aëroplane, consisting of three superposed planes, rigidly constructed of rods and diagonal wires, and propelled by a high-pressure steam engine actuating twin screws, and guided by a tail. It was capable of small flights.

In 1893 Horatio Phillips tested an aëroplane whose wings consisted of many narrow slats superposed like an open Venetian blind, each slat being concave underneath, to give better lift. He has recently made short flights with such a machine, carrying one man. His device was the first having wings composed of concave superposed surfaces, an arrangement now in common use in the biplanes.

In 1893 Hiram Maxim built an aëroplane consisting of one large central plane, slightly arched, three side planes on either side, one horizontal plane front and rear, for steering, the whole surface aggregating 5,500 sq. ft. The complete machine weighed 31½ tons, and was driven by a 360-horse-power steam engine actuating twin screws 17'–10" in diameter, exerting a thrust of 2,000 lb. The machine was mounted on wheels and ran along a track 8 ft. wide and half a mile long, with extra guard rails just above the wheels. At a speed of 40 m. an hour the aëroplane lifted against the upper rails with its great weight increased by more than a ton of extra load. This showed the possibility of carrying five tons in such manner, but the aëroplane was badly designed for stability. The experiments cost $100,000, and were stopped for lack of funds.

Otto Lilienthal, of Berlin, the father of aërial gliding, practiced coasting down the air in motorless monoplanes and biplanes from 1891 to 1896, when he lost his life after 2,000 successful flights. He, like Phillips, proved by careful measurement the superiority of arched, or concave, surfaces for the wings of an aëroplane. The work was continued by O. Chanute, aided by A. M. Herring, on the sandy slope of Lake Michigan, in the summer of 1896. They executed safely many aërial glides down the sand dunes, on various types of gliders, finally adopting one having two superposed concave surfaces trussed together by vertical rods and diagonal stay wires, and having a double rudder at the rear elastically connected with the body surfaces. Their glider was controlled in flight by the pilot shifting his weight, as he hung by his arms beneath the machine. The ultimate purpose of the four inventors was to add a motor to their passive aëroplanes, so as to fly by inherent power.

Wilbur and Orville Wright, continuing these experiments in 1900, controlled the lateral poise of their glider by changing the angle of impact of the wings on either side, as proposed by Dr. Zahm in 1893, and controlled their fore and aft equilibrium by use of a steering plane in front, as previously done by Maxim, the pilot assuming the recumbent position, as done by Wenham, and the aëroplane being mounted on skids, as used by Ader. Having acquired skill in gliding down sand hills at Kitty Hawk, N. C., they applied a gasoline motor and twin screws, thus achieving short flights, first on December 17, 1903. In 1904 and 1905 they made longer flights near Dayton, Ohio, the longest being 24 m. in thirty-eight minutes, in October, 1905.

Many new aviators in France were now actively at work. Of these, Santos-Dumont made short flights in 1906, in an aëroplane like a box kite, driven by one screw actuated by a 50-horse-power Antoinette motor. In 1907 Henri Farman, an artist, aided by the Voisin brothers, experienced aëroplanists and manufacturers of fliers, brought out a successful biplane resembling a Chanute glider, propelled by a single screw attached to the shaft of a 50-horse-power Antoinette gasoline motor. In 1908 Leon Delagrange used a like machine in competition with Farman. They made flights of gradually increasing lengths, soon extending to many miles. On October 30th Farman flew across country from Chalons to Rheims, a distance of 27 kilometers, in twenty minutes. He won the endurance contest at the first international aviation meet, held near Rheims in August, 1909, by flying three and a quarter hours and covering a distance of 118 m. On November 4, 1909, he flew 144 m. in four hours six minutes twenty-five seconds at Mourmelon, France. At the Rheims meet Glenn H. Curtiss won the speed contest in a 60-horse-power biplane, flying three times around a rectangular 10-kilometer course in twenty-three minutes twenty-nine seconds official time, or at a speed of 47 m. an hour. His aëroplane had its origin in the experiments of the Aërial Experi-

ment Association at Hammondsport, N. Y., an organization endowed by Mrs. A. G. Bell. Hubert Latham won the prize for altitude at Rheims by flying to a height of 508.5 ft., as recorded by a barometer carried by him. This monoplane was built by the Antoinette Company, and powered by their wonderful motor, designed by Levavasseur. This record of height was far surpassed by Orville Wright at Potsdam, October 22, 1909, who reached an elevation roughly estimated at 500 meters. Two months previously he had raised another world's record by flying one hour and twelve minutes with a passenger, at Fort Myer, Va.

Flying Phalan'ger, one of the marsupials of Australia and the neighboring islands; surprisingly like the flying squirrels in appearance and habits, and are the marsupial representatives of those squirrels; species rather numerous; largest, the *Petaurus flaviventer*, is 20 in. long, and its tail measures 18 in.; smallest, *Acrobates pygmæus*, is 2 in. long, and tail is same length.

Flying Squid, name given to the cephalopods of the genus *Ommastrephes*, of which there are many species, varying in length from an inch to 4 ft.; have the power of leaping from the water; are preyed on by sperm whales, birds, and fishes, and are largely employed as bait by fishermen.

Flying Squir'rel, animal of the genus *Sciuropterus* (family *Sciuridæ*), characterized by a hairy expansion of the skin between the fore



FLYING SQUIRREL.

and hind limbs by which the animal is enabled to glide from tree to tree in very prolonged leaps. The tail also aids to support it in the air. The common species of the U. S. is *S. volucella.*

Fo, or **Foh,** Chinese equivalent of Buddha. Hence Buddhism as it exists in China is sometimes called *Fohism*, and the votaries of Buddhism *Fohists.*

Fœ'tus. See FETUS.

Fog, body of vapor of water in the atmosphere, like clouds, but distinguished from them both by position and by the manner of formation. A large class of clouds result from the diminution of temperature produced by the elevation and expansion of moist air, while others are produced by radiation, principally into the interstellar regions. To these simple causes also must be attributed the formation of a large class of fogs. On the other hand, the peculiar feature in the origin of many, and especially of the heaviest fogs, is radiation downward to a comparatively cold body below, as water or earth. A theory was announced by Kratzenstein that the vesicles of vapor in a fog are spherical shells; but this is not sustained, and their buoyancy is sufficiently accounted for by their minuteness, which property gives impalpable dust its power to float in the air.

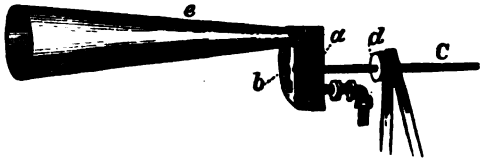
Foggia (fŏd'jä), capital of province of same name in Italy; in the plain of Apulia, 80 m. NE. of Naples. Underneath the fine principal streets and squares are vaults for storing grain, in which there is much trade, as well as in wool, cattle, cheese, capers, wine, and oil. Within 5 m. are the still visible ruins of Arpi or Argyrippa, which gave to Foggia its earliest settlers, probably in the ninth century. The Emperor Frederick II built a palace here, 1223, and his natural son Manfred here defeated the legate of Pope Innocent IV. Pop. (1901) 53,151.

Fo'go, one of the Cape Verde Islands; consists of a single volcanic cone rising 9,157 ft., surrounded at the base with a steep wall of immense lava blocks; area, 171 sq. m.; soil exceedingly fertile, and produces grain, wine, fruits, and tobacco of the very first quality; lacks water, and droughts are sometimes so prolonged as to cause famine, during which thousands of the inhabitants starve to death.

Fog Sig'nals, warnings given in foggy weather to prevent accidents to vessels or railroad trains, and the instruments for giving them. Attempts have been made to penetrate fogs by lights of intense power, as those of electricity, but without practical success, and the chief dependence is on sound. The locomotive whistle is the simplest of the more powerful of the fog signals employed by the U. S. Lighthouse Board. It is actuated by an ordinary locomotive steam boiler at a pressure of from 50 to 75 lbs. per sq. in. The sound is distinguished from that of locomotives and steam vessels by the length of the blast and the interval between two soundings. These are produced and regulated automatically by a small engine attached to the boiler, which opens and closes the valves, letting on and shutting off the steam at fixed intervals. The whistles employed are from 8 to 12 in. in diameter.

The next powerful instrument is the reed or Daboll trumpet, actuated by air condensed in a reservoir by an Ericsson caloric (or hot-air) engine. In this instrument the trumpet itself is the resounding cavity, and the reed by its vibration produces the requisite motion of the air. Another instrument, and the most powerful of all yet employed, is the siren trumpet. The siren is the invention of Ca-

gniard de Latour, but its application as a fog signal and the addition of the trumpet were patented by the Messrs. Brown, of New York. Its sound can be heard distinctly in still air at a distance of from 20 to 30 m. It is usually operated at a pressure of 75 lbs. of steam, generated in a locomotive boiler. Of the submarine fog signals the one in Halifax harbor is perhaps typical. A bell 70 ft. below water is rung by electro-magnets actuated by an electric current transmitted by cable from the



A Type of Fog Signal.

a, Steam drum with one hole on front face; *b*, revolving plate, perforated with eight holes and supported on the shaft *c*; *d*, a pulley to which rapid motion is given by a band and driving wheel; *e*, resonator or trumpet.

shore 2 m. distant. On shipboard the sounds are received through microphones placed inside the hull in tanks filled with water and fixed to the outer plating or skin of the ship. These microphones consist of a small box of loosely packed carbon grains, one side of the box being a fixed plate of metal or carbon and the other a flexible disk, which moves in accord with the pressure of the sound waves striking it, and reproduces them in the telephone attached. In this manner the sound of the fog bell can be heard at a distance of 16 m. The same device is used between ships. When the bell is merely suspended over the ship's side from a davit, the most convenient agent for ringing it is compressed air.

Fo-Hi (fō'hē), or **Fuh-Hi**, half mythical character in Chinese history generally considered the founder of the Chinese nation. His accession is assigned in Chinese annals to 2852 B.C., but is placed by Dr. Legge 3322 B.C. He is said to have introduced social order, music, writing, and marriage, and established a kind of mystic religion, which susperseded to a great extent the old star worship.

Foil, thin sheets of metal thicker than the leaf metal of commerce. Gold foil is obtained by beating. It is, in fact, unfinished gold leaf, and is chiefly used by dentists for stopping teeth. Tin foil is obtained by rolling the metal or by shaving a thin layer from a block of tin. The latter operation is done by an ingenious machine, which not only cuts off the foil, but rolls and stretches it at the same time. It is often adulterated with lead. Pure tin foil is used in chemistry and the arts. Foils of copper and other metals are used for the backing of gems when set. The skillful use of colored foils sets off and greatly heightens the effect of most precious stones.

Foix (fwä), **Counts of**, French family prominent from the eleventh century to the sixteenth century. The first to assume the title was Roger (d. 1064), who inherited the town of Foix and adjoining territory from his uncle, the Count of Carcassonne. Raymond Roger reigned 1188–1223; engaged in the third crusade under Philip Augustus; and sided with the Count of Toulouse and the Albigenses against Simon de Montfort. His son, Roger Bernard II, styled The Great, was forced, 1229, into submission to the king and the pope. Roger Bernard III (1265–1302) gained reputation as a troubadour, but was unsuccessful in his wars with the kings of France and Aragon. Gaston II (1315–43) did good service against the English, and assisted Alfonso XI of Castile against the Moors. Gaston III, called Phœbus, his son (1331–90), signalized himself against the English in Guienne and Languedoc, and fought bravely with the Teutonic Knights against the Prussians; contributed to the defeat of the Jacquerie, besieging the royal chateau at Meaux; secured possession of Béarn, 1362; was appointed Governor of Languedoc by Charles V, 1380. Gaston IV (d. 1472) married Eleonora, Princess and afterwards Queen Regnant of Navarre. Her heiress, Catherine de Foix, marrying Jean d'Albret (1484), the county of Foix was united with Navarre. Her rights to the county were long disputed by her uncle, Jean de Foix, Viscount of Narbonne. A son of the latter was the hero and victim of the battle of Ravenna. See Gaston de Foix.

Foix, town of Ariège, France; at the foot of the Pyrenees; birthplace of Gaston de Foix, and the residence of the counts of Foix, of whose ancient castle only three towers remain; has some trade in iron.

Fo'ley, John Henry, 1818–74; Irish sculptor; b. Dublin; studied in the Royal Academy, London; besides portrait statues, he executed "Ino and the Infant Bacchus," the "Death of Lear," "Venus Rescuing Æneas," etc. For the Albert memorial in Hyde Park he executed the colossal statue of Prince Albert and the group "Asia," and for the State of S. Carolina a bronze statue of "Stonewall" Jackson.

Folkes, Martin, 1690–1754; English antiquary; b. London; so distinguished by his mathematical studies that, 1713, he became a fellow of the Royal Society, and, 1741, its president. In 1733 published his "Dissertations on the Weights and Values of Ancient Coins"; principal work, "Table of English Gold Coins," 1745, together with a history of silver coinage in England.

Folkestone (fōk'stūn), town of Kent, England; on the Straits of Dover; 7 m. SW. of Dover; a favorite watering place, and its harbor is much frequented by mackerel and herring fishermen; anciently of larger importance; still has traces of Roman defenses, but many old buildings have been swept away by the sea. Pop. (1901) 30,660.

Folkland (fōk'länd), in Anglo-Saxon laws and institutions, lands owned by the community at large. When the institutions of the ancient Germans were first observed by the

Romans this primitive mode of proprietorship was the basis of their tribal polity. The territory of a tribe, divided into cantons and then into townships (marks), was allotted by the tribal authorities to the individual freemen. Of the territory of Gaul, Spain, Italy, etc., seized by the conquerors from the provincial owners during the invasions, a portion was divided in unequal amounts among the warriors and heads of families, who thus became "allodial" proprietors. The remainder of the territory belonged to the community, and was held under the control and at the disposal of the supreme authority—king or assembly of the people. Of this public land a part was appropriated to the uses of the government and to the support of the crown; a part was granted to allodial proprietors; while another part was bestowed as benefices on individuals who, in consideration of fealty and services rendered, enjoyed in the usufruct only, the ultimate ownership remaining in the state.

In time allodial proprietorship disappeared, the allodial proprietors changing their lands into feudal benefices to obtain for themselves as vassals the protection of powerful lords.

Folkland, being the property of the people as a whole, could not be alienated or changed without some act of the government. In the earliest periods of the Saxon commonwealths the "gemote," or general assembly, alone possessed this power. In later times the charter still required the assent of the king's "witan," or council of advisers. As the king came to be regarded as the representative of the state, embodying in himself the supreme authority, the theory was adopted that the folkland belonged to him in his official capacity, and the term "crownlands" was substituted for that of "folkland."

Folk'lore, that mass of customs, beliefs, and ideas which has been traditionally communicated from generation to generation. The province of folklore is so extensive, its boundaries so undefined and variable, the survey of the ground so recent and incomplete, and the determination of limits so much a matter of individual preference, that no method of mapping out the field has yet received general recognition, nor perhaps can any system of classification be proposed which will not be found to involve inconsistencies, deficiencies, and cross divisions. Gomme's divisions are: (1) Traditional Narratives—(*a*) Folk Tales, (*b*) Hero Tales, (*c*) Ballads and Songs, (*d*) Place Legends; (2) Traditional Customs—(*a*) Local Customs, (*b*) Festival Customs, (*c*) Ceremonial Customs, (*d*) Games; (3) Superstitions and Beliefs—(*a*) Witchcraft, (*b*) Astrology, (*c*) Superstitious Practices and Fancies; (4) Folk Speech—(*a*) Popular Sayings, (*b*) Popular Nomenclature, (*c*) Proverbs, (*d*) Jingle Rhymes, Riddles, etc. Another division is into three sections, corresponding to the categories of action, thought, and expression, under the headings of customs, superstitions, and oral literature. Although the term originated as late as 1846, folklore has already a very large bibliography, attesting its universal popularity. See MYTHOLOGY.

Fol'ly Is'land, island of S. Carolina; in Charleston Co.; extends SW. from Lighthouse Inlet to Stone River, having Folly Island River on the NW. and the ocean on the SE.; in part heavily timbered; the scene of important operations during the Civil War.

Fol'som, Nathaniel, 1726–90; American soldier; b. Exeter, N. H.; commanded a company at Fort Edward, 1755, and aided in the capture of Baron Dieskau; commanded a regiment of militia before the Revolution, and as brigadier general of the New Hampshire forces served in the siege of Boston until July, 1775; member of the Continental Congress, 1774–75 and 1777–80; president of the convention which framed the constitution of New Hampshire, 1783.

Fomenta'tion, in therapeutics, hot applications, wet or dry (wet fomentation, dry fomentation), to diseased parts. Fomentations act chiefly by the heat and moisture they convey to the surface treated, but they are sometimes medicated. Fomentation is usually a safe, and often an effective, means of treating disease.

Fond du Lac (fŏn-dū-lăk'), capital of Fond du Lac Co., Wis.; on Lake Winnebago, at the mouth of Fond du Lac River; 148 m. from Chicago; on a plain surrounded by hills and groves; has Grafton Hall (P. E.), two convents, female institute, public library, several public gardens for outdoor amusements, manufactures of lumber, agricultural machinery, cars, paper, etc., and trade in grain, lumber, and pork. Water is supplied by the Holly system from artesian wells, the mineral properties of which have made them famous. Pop. (1905) 17,284.

Fonseca (fŏn-sā'kä), **Juan Rodriguez de**, 1451–1524; Spanish ecclesiastic and administrator; b. Toro; successively Archdeacon of Seville, Bishop of Badajoz, Palencia, and Conde, Archbishop of Rosario in Italy, and finally Bishop of Burgos, besides being head chaplain of Queen Isabella and afterwards of King Ferdinand. In 1493 he superintended preparations for the second voyage of Columbus, and thereafter had control of all matters relating to the New World until the death of Ferdinand, 1516. Columbus quarreled with him almost from the first, and Fonseca's influence was constantly exerted against him and his family; he also schemed against Cortés, and opposed the reforms of Las Casas.

Fonseca, Manuel Deodoro da, 1827–92; Brazilian soldier and politician; b. province of Alagoas; entered the army as a cadet, 1843; in the Paraguayan War, 1868–70, he served as colonel; later was commandant of various provinces, and became major general. In 1887 he and others opposed certain acts of the government, and were punished. The malcontents brought about a mutiny, deposed and banished the emperor (November 15, 1889), proclaimed a republic, and made Fonseca chief of the provisional government. The republic was recognized by the U. S., and later by France, Great Britain, and other countries. A constituent

assembly met on January 20, 1891; the constitution proposed by Fonseca and his colleagues was adopted, and Fonseca was elected president for four years with the military title of marshal, but was forced to resign, November 23d.

Fonseca, Bay of, formerly called Gulf of Conchagua, inlet of the Pacific; in the SW. coast of Central America; between Salvador on the W., Honduras on the NE., and Nicaragua on the SE.; mouth, 22 m. wide between two opposing points, and divided by islands into four channels, all admitting large vessels; within the bay broadens. It contains several islands, and there are a number of good ports on the coast, the bay itself forming a large and secure harbor. The volcano of Coseguina is on the S. side of the entrance to the bay.

Fontaine (fŏn-tān'), **Jean de la.** See LA FONTAINE.

Fontaine, Pierre François Louis, 1762–1853; French architect; b. Pontoise; practiced during the whole period from the first republic to the second empire; chief works: extensive alterations of the court and staircase of the old Louvre; plans for uniting the Tuileries to the Louvre; the Arc de Triomphe du Carrousel (1807); the Chapelle Expiatoire for Louis XVIII (1815–20); and the Chapelle St. Ferdinand, memorial to Duke of Orleans (1843).

Fontainebleau (fŏn-tān-blō'), town of Seine-et-Marne, France; 35 m. SE. of Paris. Its palace, built in the twelfth century, and enlarged and embellished in each succeeding century, is one of the most magnificent in France. The forest which surrounds it, wholly laid out as a landscape garden, comprises 64 sq. m., and the roofing of the palace covers no less than fourteen acres. The present structure was begun by Francis I, who employed Leonardo da Vinci, Andrea del Sarto, and Benvenuto Cellini to complete and execute his plans. It was enlarged by Henry IV, who added the Diana Gallery, the Court of the Princes, and the Galerie des Cerfs. The later Bourbons disliked and neglected the place, but it was again restored with magnificence by Napoleon I, who spent 6,000,000 fr. on it. The first of the five great courts still bears the name in popular parlance of the Court of Adieux, as it was there Napoleon bade farewell to the "Old Guard." The town has some trade in wine, grapes, garden produce, etc., and some manufactures of porcelain and earthenware. Pop. (1901) 14,160.

Fontana (fŏn-tä'nä), name of many Italian painters of the sixteenth and seventeenth centuries. Among them was PROSPERO (1512–97), instructor of the Carracci, and one of the most prolific painters of the Bolognese school. His daughter LAVINIA (1552–1614) attained almost the excellence of Guido in some of her portraits. Famous among architects of the family was DOMENICO (1543–1607), who finished the cupola of the Basilica of St. Peter, and designed the library of the Vatican. Another architect, CARLO (1634–1714), was employed under seven successive popes,

Fon'tanel, soft palpitating spot on the head of a young infant; so called because its throbbing was likened to the welling up of a fountain. The fontanels are usually from four to six in number, but in most cases only one or two are easily detected. The great fontanel is at the crossing of the coronal and sagittal sutures. They are caused by the incomplete hardening of the skull bones, and are generally closed by the development of the bones within two years after birth.

Fontanes (fōn-tän'), **Louis** (Marquis de), 1757–1821; French writer; b. Niort; translated Pope's "Essay on Man"; wrote the petition of the Lyonnese (1793) against the ferocity of Collot-d'Herbois; fled to England, where he became intimate with Chateaubriand; returned 1799; became member of the legislative body, 1802; its president, 1804; Grand Master of the university, 1808; Senator, 1810; and, after the Restoration, a peer. On account of his finished and elegant diction, he was called Racine's last descendant.

Fon'te Avella'na, Or'der of, monastic order established in 1001 at Fonte Avellana, near Faenza, Italy, by Ludolf, Bishop of Iguvium; in 1570, was united to the Camaldulians; St. Peter Damian was its most famous member.

Fontenay-le-Comte (fōn-tē-nā'-lē-kōnt'), town of France, department of Vendée; on the Vendée; has linen manufactures and tanneries. On May 16, 1793, it was the scene of the victory of the republican army under Chabot over the Vendeans. Pop. (1901) 9,698.

Fontenelle (fōnt-nĕl'), **Bernard le Bovier de,** 1657–1757; French author; nephew of Corneille; b. Rouen; admitted to the French Academy, 1691, and to the Academy of Sciences, 1697, of which he was perpetual secretary, 1699–1741. His "Dialogues of the Dead" was published, 1683; "Discourse on the Plurality of Worlds," 1686, and "Essay on the Geometry of the Infinite," 1727; wrote also "History of Oracles," and in forty years composed eulogies on about seventy members of the French Academy of Sciences.

Fontenoy (fōn-tē-nwä'), village of Belgium; province of Hainaut; 5 m. SE. of Tournay. Here was fought, May 11, 1745, the famous battle between the French under Marshal Saxe and the allied English, Dutch, and Austrians under the Duke of Cumberland, in which the French won a great victory.

Foochoo', or Foochow'. See FUCHAN.

Food, solid and liquid substances for the nourishment of the body. The processes of nutrition involve the waste of the material of the body, and therefore constant replacement. Foods must contain the elements by which this replacement is effected, and include inorganic substances, starch and sugar, fats, and albuminoids. *Inorganic substances* include water and salts. Water composes from two thirds to three quarters of the human body, and is discharged by the perspiration, respiration, urine, and fæces. The principal mineral salts in the body are the phosphates (chiefly phos-

phate of lime, in the bones), chloride of sodium (common salt), and the carbonates of soda and potash. The food must therefore contain them, but not necessarily in the same chemical form. Many fruits and vegetables contain lime, potash, and soda, combined with organic acids, such as malic, tartaric, and citric acids; and these compounds are decomposed in the body, the vegetable acids being replaced by carbonic acid.

Starch and sugar are closely related to each other, and are called carbohydrates, being composed of carbon, hydrogen, and oxygen. Starch is found in a vast number of vegetables. In cooking, or heating the starch, its grains swell and become softened; if cooked with hot water they absorb it, and at last, if the heat be continued and the water abundant, they become a pasty mass. In this condition they are more digestible than when raw, and it is in this form that starch is almost always used as food. Sugar is taken as an addition to other substances, and also as a natural ingredient in the sweet juices of fruits and vegetables. Wheat flour contains 5 per cent of sugar, milk nearly 5 per cent, beets 9 per cent, pears over 10 per cent, peaches and cherries 16 to 18 per cent.

The *fats*, like starch and sugar, consist of carbon, hydrogen, and oxygen, but in proportions different from those in the former group; and they also differ from them in physical properties. They are of both animal and vegetable origin, constituting the greater part of the fat of animals, more than 25 per cent of the yolk of eggs, the whole of butter, 9 per cent of Indian corn, and from 50 to 60 per cent of most nuts.

Albuminoids are distinguished from the starches and fats by containing nitrogen; and are sometimes called the nitrogenous elements. The albumen of the white of egg is a familiar example of albumen. Syntonin musculin, similar in composition to albumen, forms the principal mass of muscular flesh, and is the chief ingredient in lean meat. Casein is present in milk, and in a coagulated form constitutes cheese. Legumin is found in peas and beans, and gluten is the albuminoid ingredient of wheat flour.

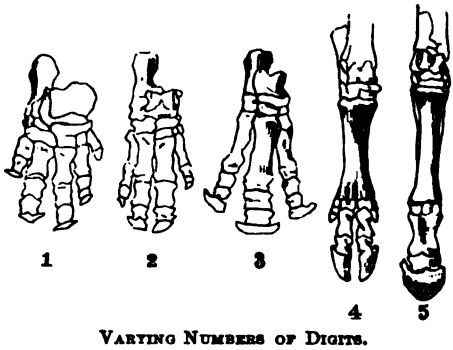
Vegetables assimilate inorganic matters, and convert them into vegetable fabric; but animals require for their nourishment materials which are already animal or vegetable; and, to be perfectly nutritious, food must contain something from each of the four groups of alimentary substances. Its nutritive value depends upon its digestibility, and its agreeableness to the appetite and taste, and can therefore only be determined by experiment and observation.

Of all foods, bread is the most important. The best and most nutritious is that made from wheat flour, which contains, on the average, 72 per cent of starch, $7\frac{3}{10}$ per cent of gluten, $5\frac{1}{10}$ per cent of sugar, and 12 per cent of water, together with gum, phosphates of lime and magnesia, alkaline sulphates, and a little common salt. In the process of making bread carbonic-acid gas is developed by fermentation of the starch in the flour, or by the decomposition of alkaline carbonates mixed with the flour, or it is injected into the dough from any source; by means of it the dough is made spongy, and the bread light and porous. Cooking renders vegetables more soluble and palatable, and gives animal substances, particularly the lean of meat, an aroma which assists digestion. See COOKERY; DIETETICS; DIGESTION; PRESERVATION OF FOOD; PURE FOOD LAWS.

Fool, Court. See COURT JESTER.

Fools, Feast of, mediæval grotesque religious ceremony, celebrated for several centuries, chiefly in France, at church festivals, especially Christmas and Easter. It originated in the pagan Saturnalia, which, in spite of prohibitions, continued to be observed in both the East and the West, and was a mixture of farce and piety, and a sportive travesty of the offices and rites of the Church. The feast of fools did not entirely disappear till toward the end of the sixteenth century.

Foot, in anatomy, the terminal part of man or an animal. In mammals the fore limbs are more generally used for the support, and the hind limbs for the propulsion, of the body; hence the *manus*, or hand, is commonly shorter and broader than the *pes*, or foot, and but few animals use the foot (hind) either for grasping or defense, save in flight. The foot is divided into three portions: (1) a group of more



VARYING NUMBERS OF DIGITS.

1, foot of the elephant; 2, foot of the hippopotamus; 3, foot of the rhinoceros; 4, foot of the deer; 5, foot of the horse.

or less rounded bones called the tarsus or instep; (2) a row of long bones placed side by side in front of the tarsus—the metatarsus; (3) the phalanges to which are jointed the digits or toes. The complete tarsus consists of seven bones. Except in abnormal instances, the digits never exceed five in number on each foot in any existing vertebrate animal above the rank of fishes, and in the class of *mammalia*, except the cetacea, the number of phalanges is limited to two in the first digit, and to three in each of the other digits in both fore and hind feet.

The hallux or great toe, though in man very strong, and one of the largest digits, is in many mammals entirely wanting, rudimentary, or inconsiderable in length. In many climbing animals it is large and prehensile. This is well

shown in the gorilla and orang. The other digits vary in number from one to five, as is illustrated respectively in the horse and the elephant.



HUMAN FOOT.

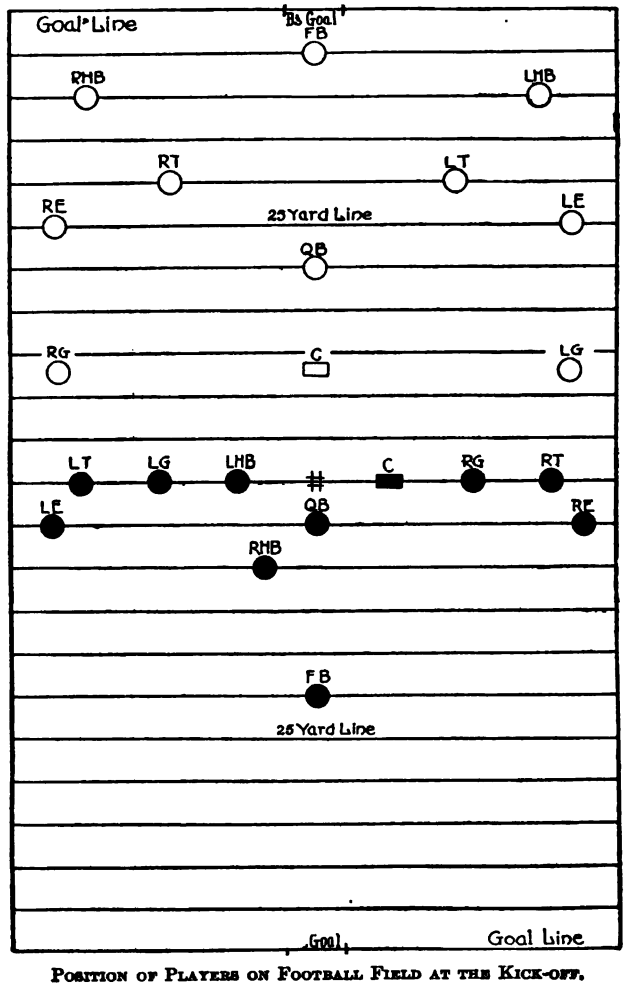
Illustrating attachment of muscles of calf (1) to the os calcis (2).

The human foot is merely a hand modified for a base of structure to support the body. It is always larger than the hand, mainly in length and thickness; is also narrower, and of an ovoidal figure, the long axis reaching from before backward. The longest transverse diameter of the foot is in front, thus giving a broader base to the support of the body, which is carried before the center of the body in walking. The solid parts of the foot are more firm than the corresponding parts of the hand, and the movable parts of the foot less movable than those of the hand.

The foot is constructed of two arches, one from front to rear, and another from side to side, the segments of which are made to yield among themselves, each a little, by interposed cartilages. There is also a special arrangement—a Y-shaped cartilage, holding the keystone of the arch and attached to the heel bone, which by its elasticity aids in giving spring to the body in motion. The length of the great toe is a characteristic of the human foot; for, while the second digit projects farther forward than does either of the other toes when the foot is viewed as a whole, yet the great toe itself alone, if compared with any other of the rows of phalanges, obtains the longest measure. The foot, though much inferior to the hand as regards adaptation to delicate operations, can acquire wonderful abnormal faculties when the hands are wanting. Thus, we hear of persons who carve, write, and paint with their toes instead of fingers.

FOOT as the unit of lineal measure is supposed to have been derived from the length of a man's foot; it is in common use in the U. S. and in Great Britain. All the nations of Europe and their colonies or dependencies employ, or have employed, a unit of length having in each language a name of the same significance as "foot" in English. In Barnard's "Metric System" may be found a table containing no fewer than 292 foot measures, all different. The confusion resulting from this great diversity long ago proved intolerable. The inconvenience caused by it in business transactions prepared the public mind of Europe early in the nineteenth century to receive with favor the new system of metrology called the metric, first definitely adopted in France in 1799. The foot has now ceased to be the legal unit of length throughout Europe except in Great Britain and Russia, and the meter has generally taken its place.

Foot'ball, athletic game of ancient origin, believed to have been introduced into Great Britain by the Romans. From a rude pastime it has been developed into a scientific game, the rules of which are odified from time to time. The game is played in the U. S. under the rules of the English Rugby, English Association, American Rugby, and American Association. The American Rugby has been the most popular. It is rougher than the English Rugby, and is played with eleven men on each side instead of fifteen, as in the English form. The roughness of the American Rugby and the injuries it entails on the players have led the authorities of many institutions to forbid its practice by their students. The



POSITION OF PLAYERS ON FOOTBALL FIELD AT THE KICK-OFF.

rules have been revised several times to lessen the chances of injury; but at the time of writing this form of the game had not been made wholly satisfactory to college officials. The two Association games were planned to meet the objections to the Rugby forms. Instead of the massing or scrimmage of the Rugby games, requiring the players to protect themselves with shin, head, nose, and shoulder guards, the Association form is primarily a kicking game, the ball being advanced in that way, and by "heading," "breasting," and "kneeing" it. Five forwards, three half backs, two full backs, and a goal tender play on each side.

The American games require a rectangular field 330 by 160 ft., the boundaries being marked with white lines, as are also cross lines at intervals of 5 yds. Goal posts, 20 ft. high, and 18 ft. 6 in. apart, with a crossbar 10 ft. from the ground, are erected at the middle of each end. The ball is elliptical, about 12 in. long, and made of inflated rubber, covered with leather. In the American Rugby the team is arranged in two distinct sets, the forwards and the backs, each having specified duties. The forward line consists of the center, who usually puts the ball in play by snapping it back between his feet; a guard on each side, with duties indicated by the name; a tackle next to each guard, who in defensive play breaks through the opposing line to seize the player having the ball; and two end men freer in action. Immediately back of the center is the quarter back, who receives the ball and places it in the hands of a third man before an advance can be made. Behind the quarter back are two half backs and a full back, who do most of the running with the ball. A secret signal indicates to every player the intended play.

Foote, Andrew Hull, 1806–63; American naval officer; b. New Haven, Conn.; entered the navy, 1822; became commander, 1852, captain, 1861; commanded the W. flotilla, 1861. February, 1862, he took Fort Henry and Fort Donelson, situated on the Tennessee and Cumberland rivers, respectively; on April 7th, received the surrender of Island No. 10, the most important Confederate stronghold on the Mississippi; forced by illness to resign command, 1862; was promoted rear admiral and received the thanks of Congress. Became chief of the Bureau of Equipment and Construction; ordered to relieve Rear-admiral Dupont off Charleston, 1863; died on his way to take command. Published "Africa and the American Flag."

Foote, Samuel, 1720–77; English actor, wit, and dramatist; "The English Aristophanes"; b. Truro; made his appearance as *Othello* at the Haymarket, 1744, but his success was small until he began to play in pieces written by himself; and his best characters were ludicrous imitations of living public men. In 1747–67 he conducted the Little Haymarket Theater without license, no one daring to enforce the law against him for fear of his terrible mimicry. He wrote at least twenty-seven plays.

Foote's Resolu'tion, resolution introduced in the U. S. Senate, December 29, 1829, by Senator Samuel A. Foote, of Connecticut, instructing the committee on public lands to inquire into the expediency of limiting the sales of the public lands for a period to those which had already been offered for sale. The resolution was interpreted by senators from the West as indicating a disposition on the part of E. senators to check W. growth by limiting land sales. In January, 1830, Robert Y. Hayne, of South Carolina, in two speeches, accused the E. states, New England in particular, of desiring to limit the public revenue in order to further centralize the government, and set forth ingeniously and elaborately the doctrines of nullification. Daniel Webster, in answer, expounded his own views on the nature of the government and those of Hayne and his supporters. In his second speech, January 27th, known as "the Reply to Hayne," he argued that the theory of the Constitution as a terminable league or compact between sovereign states was unsupported by the history of its origin, and that the attempts on the part of any state to act on that theory must necessarily entail civil war or the disruption of the Union. The effect of Webster's speech was so great that Calhoun in the following December resigned the vice presidency in order that he might resume his old place in the Senate, and there meet his old antagonist. The influence of the debate on Foote's resolution was to consolidate the North and the South in their respective opinions, and thus prepare the way for the Civil War.

Fop'pa, Vincenzo, 1400–92; Italian painter; b. Brescia; established a school of painting at Milan abt. 1445, which flourished up to the time of Leonardo da Vinci; was a great colorist and one of the first to introduce bold foreshortening in his compositions. His works are to be seen at the Brera Gallery in Milan. The painting of the Chapel of Peter Martyr in Sant' Eustorgio, one of the most exquisite pieces of decoration of the fifteenth century, is also by him.

Fora'men (plural **Foram'ina**), in anatomy, any natural opening through a substance; especially applied to the bony passages through which the nerves and blood vessels enter and leave the skull and spinal canal.

Foraminif'era, order of the *Protozoa*, of the class of rhizopods, having the power of projecting and retracting through openings in their calcareous shell temporary threadlike prolongations of sarcode, or the simple gelatinous substance of which the body is composed; by these processes they move and obtain food. They are all marine, and are distributed all over the world. They were among the earliest animals, and the oldest known fossil, eozoön, is a foraminifer. Chalk is composed principally of the shells of foraminifera, and deep-sea dredgings show the formation of a chalky ooze at the bottom of the ocean by the accumulation of dead foraminifera.

Forbes (fôrbz), **Archibald,** 1838–1900; British journalist; b. Moray, Scotland; served for

several years in the Royal Dragoons; after 1870 was war correspondent of the London *Daily News*; author of "Drawn from Life," a military novel; "My Experiences of the War between France and Germany," "Glimpses through the Cannon Smoke," "Life of Chinese Gordon," "Life of the Emperor William of Germany," "Havelock," etc.

Forbes, Duncan, 1685–1747; Scottish statesman; b. near Inverness; became an advocate, 1709, was active in suppressing the rebellion of 1715. In 1716 he was appointed advocate depute; in 1722 elected to the British House of Commons; in 1725 became Lord Advocate, and, 1737, Lord President of the Court of Sessions. He was efficient in preventing the spread of the rebellion of 1745; sought to moderate the fury of the victors; and was basely treated by the government, none of his large advances being repaid. The battle of Culloden took its name from his family estate.

Forbes, Edward, 1815–54; English naturalist; b. Isle of Man; in 1841 was appointed naturalist on the surveying ship *Beacon*, destined for the coast of Asia Minor to receive the Xanthian marbles. His researches on the cruise proved that there are zones of marine animal life. 1842 Prof. of Botany, King's College, London, and soon after curator of the museum of the Geological Society. He took part in the preparation of the paleontological and geological map of the British Isles. In 1852 became president of the Geological Society, and, 1853, Prof. of Natural History, Univ. of Edinburgh.

Forbid'den Fruit, name given in different countries to fruits which, according to tradition, represent the fruit of which Adam and Eve ate at the time of man's fall in Eden. One of these is a thick-skinned orange (*Citrus aurantium*, var. *Paradisi*) the marks on which may be likened to tooth marks; another is the poisonous fruit of *Tabernæmontana dichotoma* of Ceylon. This fruit also looks as if bitten.

Force, any action between material bodies by which they change, or tend to change, each other's condition. Every change of condition of a material body implies motion of some kind, either of the mass (molar) or of its component particles (molecular). Our earliest idea of force is derived from the resistance of matter to the touch. Nothing is known of force except as a cause producing, or tending to produce, motion or change of motion in matter. Force, therefore, is the cause of all physical phenomena, not only those mechanical, but also those attendant on heat, light, electricity, and chemical action. Mechanical forces are such as produce their effects upon masses of measurable magnitude directly. They are distinguished as dynamical (producing actual motion; see DYNAMICS) and statical (held in check by opposing forces; see STATICS). Statical forces may be compared with each other by means of the efforts or pressures they exert, which may be measured by a spring balance, or by opposing them to known forces through an intervening lever. But as static forces produce motion if opposed by resistances less than themselves, such forces may also be measured by their relative power to generate motion when all resistance is removed. A heavy body resting upon a support exerts a pressure which is due to the force of gravity acting statically. If the support be removed, the body falls.

The forces of nature which are characteristically different from each other are as follows: (1) gravitation; (2) molecular force; (3) chemical affinity; (4) heat and light; (5) electricity; (6) vital force. Gravitation, which is the attraction between bodies at a distance, is proportional directly to the product of the two masses, and inversely to the square of the distance between them. Molecular force is the attraction between the particles of bodies, and is manifested in solids and liquids by their cohesion and elasticity, and in liquids additionally in capillarity and osmose. Chemical affinity resembles the force last named in acting at insensible distances, but differs in being manifested only between unlike substances. Heat is supposed to be a mode of vibratory motion actuating the molecules of every material substance. Elevation of temperature is explained as an increase in the energy of the vibrations and an enlargement of their amplitude, whereby the volume of the combined mass is expanded, and ultimately the cohesion and even the affinities of its molecules are overcome. These vibrations are supposed to be propagated from body to body by undulations in an exceedingly rare medium filling all space, called ether. When these undulations fall within certain definitely assigned limits as to length, they have power to affect the retina of the eye, and thus give rise to the phenomena of light.

Electricity is an energetic force, the physical theory of which is still unsettled. It produces, according to circumstances, attractions and repulsions between masses and between molecules. Magnetism is but a form of electrical action. Vital force is more obscure as to its manner of action than any other; and it is even denied by many physicists and physiologists that any such distinctive force exists, all the phenomena ascribed to it being attributed to electricity, chemical affinity, and heat. There exists in the nervous centers of living animals a certain power which can cause contraction of the muscles of the body by exciting the proper nerves. The velocity with which this message is transmitted is by no means great, not exceeding twenty or thirty meters per second. When a whale is struck by a harpoon, such is the size of the animal that quite an interval elapses before the brain can be informed of the fact, and can put the muscles of the tail in operation; so that, before this effect is produced, the whalers have time to retreat.

Force Bill, The, name popularly applied to the bill introduced in the U. S. Congress, March 15, 1890, for Federal control of Federal elections; passed in the House of Representatives, July 2d, went to the Senate, and, after a bitter struggle, was forced aside without a de-

cisive vote, January 17, 1891. The Democrats who opposed it made the bill an important issue in the campaign of 1892.

Forcellini (fōr-chĕl-lē'nē), **Egidio,** 1688–1768; Italian lexicographer; b. Féuer; was a pupil of Facciolati, under whom he revised Calepino's Latin-Italian "Dictionary," and prepared a complete dictionary of the Latin language, which occupied nearly forty years of his life.

For'ceps, in surgery, an instrument for seizing, and often for removing, bodies which cannot conveniently be seized by the hand. Forceps are of many forms. Special kinds are used for special purposes, as for drawing teeth, for cleansing sores, for seizing a bleeding artery (hemostatic forceps), for extracting bullets, for assisting in the birth of the fetus, and for many other uses.

For'cible En'try, in law, forcible entry and detainer is the unlawful and violent entry on and taking possession or keeping of lands or tenements, with actual or threatened force or violence. In the U. S. generally it is an indictable offense, and a remedy by civil suit is also given.

For'cing, among gardeners, properly the production of any fruit or flower out of its proper season by the use of hot or cold frames, glass houses, stimulating fertilizers, especially those rich in ammonia, and other like appliances. Fruit trees, especially cherry trees, are often forced, in the true meaning of the word. The Chinese and Japanese are masters in the art of forcing.

Forcite (fōr'sīt). See EXPLOSIVES.

Ford, John, 1586–1640; English dramatist; b. Ilsington; entered the Middle Temple, London, 1602, and appears to have practiced law with success. He produced, alone or in conjunction with other dramatists, a dozen or more plays, of which "The Broken Heart" and "Perkin Warbeck" are esteemed the best.

Fore'fathers' Day, anniversary of the landing of the Pilgrims at Plymouth, Mass., 1620. The event occurred on Monday, December 11th, old style. The day was first publicly and formally commemorated in 1769, when seven gentlemen of Plymouth, on December 18th, formed the Old Colony Club to celebrate "the landing of our worthy ancestors in this place." Eleven days were erroneously added to the recorded date, in order to accommodate the event to the Gregorian style; hence the date, December 22d, came to be accepted generally.

The Gregorian calendar was not adopted in England until 1752, when it was necessary to add eleven days to old style in order to correct the error. But in 1620 the addition of ten days only was necessary to correct the error, the same that had been provided for in 1582 by Pope Gregory when the Gregorian calendar was substituted for the Julian. It follows that the date of landing, new style, was December 21st, instead of December 22d, which is usually celebrated.

For'eign Attach'ment, process of attachment by which the property of a foreign or absent debtor in the hands of third persons, or debts due him from them, may be levied upon for the discharge of his indebtedness to a suing creditor. This procedure has existed in England from a very remote period, but only in a few of the larger cities, as London, Liverpool, etc., and owes its origin to immemorial usage in these particular localities, but does not constitute a part of the common law. In many states of the U. S. a process similar to foreign attachment has been adopted by statute, providing for a levy upon the property of absent, nonresident, and absconding debtors, *i.e.*, of debtors who are outside the state, but its application is not everywhere of the same extent.

Foreign Corpora'tion, in law, corporation organized under the laws of a foreign state. A corporation is not a person in the sense that a natural person is, although for most legal purposes it is considered as a person. A corporation existing under the laws of one state in the U. S. is a foreign corporation in all other states, it being settled that a corporation is not a citizen within the meaning of the constitutional provision entitling "the citizens of each state to all privileges and immunities of the citizens in the several states." It follows, therefore, that, as well among the several states of the U. S. as between other independent sovereignties, corporations have no recognized legal existence as such outside the state under and by virtue of whose laws they exist. The corporation legally exists only in the jurisdiction where the laws under which it is incorporated exist and are obligatory.

For the purposes of Federal jurisdiction in actions in the U. S. a corporation is a person, and when sued in a state foreign to the state of its domicile it may remove the cause to a Federal court, as a natural person might. This is true, even though the corporation may be doing business in the foreign state under a certificate authorizing it to do so, obtained from the proper officer; but where the corporation has received corporate privileges in the foreign state, it then becomes a citizen of that state for the purposes of jurisdiction as well as of the state under which it was first created.

Foreign Judg'ment, judgment of a foreign tribunal. As no state is under any obligation to enforce laws which are not of its own creation, the effect to be given to foreign judgments must depend entirely on the comity of nations in their mutual relations. The general voluntary acceptance among nations of the principles of international law has included the recognition of the validity of such judgments when rendered by tribunals, having jurisdiction of the cause determined, and when the proceedings were characterized by no fatal irregularity or fraud. Due inquiry may be instituted as to the authority of the foreign court and the conduct of the suit, in order to ascertain whether any oppression was exerted or injustice done; but if no error appears, the decree is sustained. This practice operates to prevent vexatious and protracted litigation by which otherwise defendants might be perse-

cuted and courts burdened, while it nevertheless tends to secure the administration of justice.

Foreknowl'edge, in theology, God's absolute knowledge or omniscience from eternity—his knowledge conceived of, as in advance of, before, the thing known. In the doctrine of Predestination, foreknowledge is regarded in its relation to the salvation of men. Calvinists make foreknowledge subsequent to and dependent on foreordination; the Arminians invert the relation, and make the purpose or ordination of God dependent upon what he foreknows. In one system the two are distinct, but not separable; in the other they are separable as well as distinct.

Fore'land, North and **South,** two promontories of England, on the E. coast of Kent, 16 m. apart. They consist of chalk cliffs, 200 ft. high, on which are lighthouses to warn the ships from the Downs and Goodwin Sands, which extend along the coast between them.

Foren'sic Med'icine. See JURISPRUDENCE, MEDICAL.

Foreordina'tion, ordination or decree in advance, the eternal appointment of all ends, and of all men to those ends, by God. When predestination, as some of the Church Fathers and some of the Calvinistic divines have used the term, covers all the acts of God's will, it is synonymous with foreordination. When predestination is confined to the purpose of God in regard to salvation, foreordination is related to predestination as a whole to a part. See CALVINISM; FOREKNOWLEDGE; PREDESTINATION.

Foreshort'ening, in drawing, painting, and engraving, the representation of objects as if turned endwise or partly endwise to the spectator, the whole length being expressed or represented by means of the drawing.

For'estry, that branch of arboriculture which concerns itself with the growing and management of trees in masses, called forests. It is the art of utilizing, reproducing, and improving in productive efficiency natural forests, or of establishing and managing new forests, wherever it is in the interest of man to do so. Forestry stands in the same relation to wood crops as agriculture to field crops. The forest is not a mere collection of individual trees, but represents a complete organism with special conditions of existence, special properties, special relationships and functions as a whole. Hence forestry does not deal, except incidentally, with single trees like orcharding, or groups of trees like landscape gardening; it deals with masses. Forestry studies the vegetation in the natural forest; and applies itself to utilizing this vegetation without impairing its physiological functions or its continued growth.

The objects of the forest in the economy of man are twofold. Its first object is to furnish by its wood and other products, useful materials without which human civilization would be greatly impeded, if not impossible. Its second object is to furnish a certain cover for the soil and secure the influence which such cover has on climate and on water conditions. This object has been only vaguely felt, until in more recent times experimental proof has been brought of the relations of forests to the weather and to water flow.

Natural forest conditions consist in dense growth, mixed growth, undergrowth. So far as any one of these conditions is deficient or lacking, by so much is the forest short of the ideal. Reduced evaporation is forest condition. Shade reduces evaporation. Dense growth furnishes not only straight, clear timber, but shade. Mixed growth alone can preserve a continuous shade for a long time. Undergrowth assists in keeping the ground shaded.

Natural regeneration or reproduction is practiced where natural growth of desirable kinds exists, either by a new growth of sprouts or shoots from the stump or stool or from seeds. The former method, reproduction by shoots, is called the coppice system, and is applicable only to such kinds of trees as sprout readily, systems of natural regeneration by seed, *viz.*, the system of echelons, in which strips are cleared and a neighboring growth of seed trees left to supply the seed for reproduction; and the system of regeneration under nurses or shelter woods, by which a number of seed trees are left scattered over the area of regeneration, and gradually removed as the young growth requires more light. This is the manner in which the primeval forest regenerates itself if left alone, old trees falling and young growths starting in the breach.

In the U. S. the national and state governments have lately given much attention to forest preservation and development, impelled thereto by an enormous and constantly increasing drain on the forest resources for manufacturing and other purposes. Between 1872 and 1904 the national government created a number of forest reservations, under the name of national parks, containing in all more than 3,600,000 acres, and in 1905 vested their administration in the Department of Agriculture.

The Bureau of Forestry promotes the conservative handling of national, state, and private forest lands, and the best utilization of forest products; investigates methods and kinds of trees for planting, and gives practical assistance to tree planters; studies commercially valuable trees to determine their best management and use; tests the strength and durability of timbers, and determines the best methods of extending their life through seasoning and preservative treatment; investigates forest fires, turpentine orcharding, and other forest problems; conducts examinations to ascertain necessary changes in the boundaries of existing national forest reserves and areas suitable for new reserves; and makes experiments in forest planting on reserves which have been denuded by fire. During the fiscal year 1908, $3,439,525.09 were expended for forest work, and the total area of national forests was increased 17,142,941 acres by presidential proclamation. See CONSERVATION OF

NATURAL RESOURCES; TIMBER; WOOD; PRESERVATION OF TIMBER.

Forey (fō-rā'), **Élie Frédéric**, 1804–72; French military officer; b. Paris; distinguished himself in Algiers; general, 1848, and took an active part in the *coup d'état*, December 2, 1851; in the Russian and Italian wars held important commands; was made Senator, 1859. In 1862 he was placed in command of 30,000 men for the invasion of Mexico; took Puebla after a severe siege, 1863, and occupied Mexico City soon after, forming a provisional government; became Marshal of France, 1863.

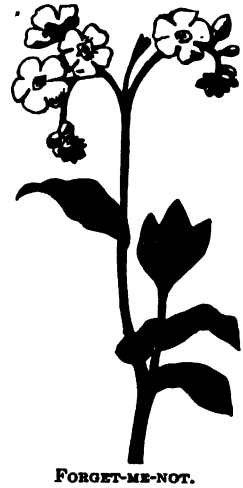
For'feiture, in law, the loss of property for some act forbidden by law, or which the party has agreed not to do under this penalty. It was annexed to treason, felony, and many other offenses by the law of England, goods and chattels being forfeited on conviction, while lands and hereditaments were forfeited only on attainder or corruption of blood. The Constitution of the U. S. declares that no attainder of treason shall work corruption of blood or forfeiture, except during the life of the person attainted; and now in England forfeiture for crime, where it exists at all, is only for the life of the person attainted. Civil forfeiture may occur: (1) By operation of law, as when the holder of an estate less than a fee made a conveyance of a greater estate than he had; at common law, this worked a forfeiture of the grantor's whole estate. (2) By the breach of conditions annexed to an estate, to which conditions a penalty of forfeiture is attached. (3) By an agreement to pay a certain sum in case some certain thing be not done at a certain time.

Forficulidæ (fôr-fĭk-ū'lĭ-dē), family of insects the members of which have received in Great Britain the common name "earwigs." The scientific position which these insects should occupy is uncertain. Some place them in the order *Orthoptera*, with the cockroaches, grasshoppers, etc., others make a distinct order—*Dermaptera* or *Euplexoptera*—for them.

Forge, factory in which iron or steel is softened by heat and worked under the hammer. The term is also applied to works in which the native oxides of iron are reduced without fusion to a metallic state, and then forged into blooms or bars. Forges differ from foundries and blast furnaces in their products being articles of wrought iron, while those of the latter are cast iron. They therefore require the use of hammers, and of furnaces adapted to heat without melting masses of iron, in part or entire. The furnaces of small forges, like those of the blacksmith, are usually supplied with air from a bellows moved with a lever by hand; but large furnaces are supplied by blowing machines moved by steam power.

For'gery, illegal falsification or counterfeiting of a writing. The offense may consist in putting a false name to a true instrument (paper or document), or of a true name to a false instrument, or even, under certain circumstances, in the application of a genuine name to a genuine instrument, where the name imposes liabilities which the party appending it had no right to impose; but to constitute the forgery of a name, it must be the name of a person actually existing or represented as such; and to be the subject of forgery a paper must purport to have legal force and validity. At common law, the publication or uttering of the forged instrument is not necessary to constitute the offense, but in the U. S. the statutes generally make the uttering essential. In the U. S., Congress and the state legislatures have enacted special laws against forgery. This crime against the Federal Govt. can be punished only under the acts of Congress; but, as a general rule, it is held that the state statutes, unless inconsistent with the common law, do not supersede the principles of the common law, so that an offender may be prosecuted either under the statute or not, as may be thought desirable. Some states have discarded the common-law procedure entirely.

Forget'-me-not, the *Myosotis palustris* of Europe, a plant of the Borage family, grows wild on high altitudes; sparingly naturalized in the U. S., and prized as the emblem of constancy in friendship and love. The U. S. has a number of forget-me-nots, mostly common to the two hemispheres. They generally have brilliant blue flowers. Many varieties appear in cultivation.



FORGET-ME-NOT.

Fork, a piece of table cutlery used in holding the food while cutting it with the knife and in conveying food to the mouth. The use of it for the latter purpose is, however, of rather late date. The ancient Greeks and Romans used the fork only to raise the boiled meat from the pot or to hold it while cutting it; for conveying food to the mouth forks were not used in Europe until late in the fifteenth century, and then for a long time only by the Italians. There is a sneering allusion to the use of forks in one of Beaumont and Fletcher's plays, and English travelers in the early part of the seventeenth century mention among strange customs peculiar to Italy that of eating with forks. Queen Elizabeth and other royal personages ate with their fingers.

Forlorn' Hope, in war, a body of volunteers destined to some particularly hazardous undertaking, such as rushing into a breach or leading a charge, and hence applied to any party engaged upon an apparently hopeless task.

For'mal Cause, in philosophy, the form, archetype, idea, or pattern of anything. Thus, the

intention or design (idea) of the artist is a formal cause of the statue. The formal cause is the *quidditas* of the Schoolmen.

For'mia, city of Italy, on the site of the ancient city of *Formia.* The origin of the ancient town is unknown. It was on the Appian Way and on the Sinus Caietanus, famed for its beautiful situation. Like many other well-to-do Romans, Cicero had a villa here, and here he was murdered.

For'mic Ac'id, simplest member of the fatty series of acids; derives its name from the ant, from which it was first prepared. It occurs in the juice of the stinging nettle and in other plants; in the ant, especially the red ant, and is projected by it as a means of defense; in some caterpillars; in human blood, urine, flesh juice, and perspiration; in some waters. It is formed by a great variety of chemical reactions.

Formica'tion, an unnatural sensation in the skin; so called from its resemblance to that produced by the crawling of ants. It is experienced as a result of pressure on the nerves of the leg or arm, the foot or hand being said to be "asleep." It is also a symptom of aconite poisoning and of spinal disease.

Formo'sa (meaning, in Portuguese, "the Beautiful"; called by the Chinese TAI-WAN—"Terrace Bay"), island belonging to Japan; abt. 90 m. E. of the Chinese province of Fuhkien; length, 237 m.; average breadth, 70 m.; area, 13,458 sq. m.; pop. 3,077,692, of whom 53,365 are Japanese. The S. half lies within the tropics. It has two well-marked physical divisions: (1) A plain about 20 m. wide on the W. coast; and (2) a forest-covered mountain system, through the center of which runs a chain of lofty peaks, including Mt. Sylvia (11,500 ft.) and Mt. Morrison (12,850 ft.). The E. coast is bold and precipitous, the mountains in some places rising sheer out of the water, 6,000 to 7,000 ft., and the water offshore being consequently very deep. The W. coast is remarkably shallow. There are no harbors and few good anchorages on either of these coasts.

The exports include coal, tea, rice, sugar, camphor, hemp, and gold dust, of which the U. S. receives a larger share than any other country except China. The population is composed of settlers from the mainland of China, and aboriginal tribes of Malay type. The latter are divided into clans, and speak several distinct dialects. They are tall and active, and have given much trouble to the Chinese settlers and to the Japanese. Tattooing is in vogue among them. The Chinese, Japanese, and Dutch, successively, conquered and held parts of the island. In 1683 the Chinese obtained full control. In 1886 it was united with the Pescadores and other adjacent islands to form a separate province, and in 1895 it was ceded to Japan by the Treaty of Shimonoseki. The chief cities are Taiwan, Tamsui, and Kelung.

Formo'sus, abt. 816–96; pope; a missionary to the Bulgarians; then Bishop of Porto; pope, 891. As the canons at that time forbade a transfer of bishops from one see to another, his election caused much controversy. Pope Stephen VI caused his body to be dug up and cast into the Tiber as an intruder, but a council, presided over by John IX, declared the pontificate of Formosus valid and confirmed his acts as pope.

Forms of Address', titles to be used in addressing written communications to individuals. In Europe and in all countries where rank and title prevail, the forms of address to be followed are a matter of solicitude. In the U. S. these forms are less varied and numerous, and an adherence to them is not absolute. Common usage has sanctioned the employment of the following forms: The President of the U. S., governors of states, and ministers to foreign countries are addressed as "His Excellency the President of the United States," etc. The Vice President, heads of executive departments at Washington, Chief Justice of the U. S., lieutenant governors of states, and mayors of cities, as "The Honorable the Vice President of the United States," etc., or "The Hon. —— ——, Vice President of the United States," etc. Senators and Representatives of the U. S., or of the several states, judges, and consuls, "The Hon. —— ——," to which may be added their official designation. Ex-Presidents and other ex-officials are addressed simply as "The Hon. —— ——." Usage differs as to the title "Honorable" in different parts of the U. S. In New England the title is limited strictly to state officers, members of Congress, judges, state Senators, and mayors of cities, and is not usually given to members of the lower house of the State Legislature.

Cardinals: "His Eminence —— ——, Cardinal Priest (or Cardinal Deacon, as the case may be) of the Holy Roman Church." Archbishops: "The Most Rev. —— ——, D.D." Bishops in the Roman Catholic and Episcopal churches: "The Right Rev. —— ——, D.D."; in the Methodist Church: "The Rev. Bishop —— ——, D.D." Ministers of the Gospel: "The Rev. —— ——," or "Rev. —— ——." Physicians and surgeons: "Dr. —— ——," or —— ——, M.D." Lawyers or private gentlemen: "—— ——, Esq.," although in the case of unprofessional gentlemen a plain "Mr. —— ——" is quite usual. The latter form is always used in invitations, and is in favor in common addresses. In addressing both husband and wife the accepted forms are: "His Excellency and Mrs. William H. Taft," "Governor and Mrs. Charles E. Hughes," "The Hon. and Mrs. Charles S. Deneen," "The Rev. and Mrs. John Brown," etc. Widows formerly wrote their names "Mrs. Ellen Smith"; present custom, "Mrs. John Smith." For some account of British usage, see COURTESY TITLES.

For'ney, John Weiss, 1817–81; American journalist; b. Lancaster, Pa.; became a printer, and in 1837 editor and joint proprietor of the Lancaster *Intelligencer*; afterwards edited the Philadelphia *Pennsylvanian* and the Washington *Union*; in 1857, established the Philadelphia *Press*, and, 1861, the Washington *Chronicle*;

was three times clerk of the U. S. House of Representatives; secretary of the U. S. Senate, 1861–68. He was long prominent in the Democratic Party, but, 1860, became a Republican; advocated the election of Horace Greeley, 1872; published "Letters on Europe" and "Anecdotes of Public Men."

For'rest, Edwin, 1806–72; American actor; b. Philadelphia; first appeared on the stage, 1820; made his first appearance in New York, as *Othello*, 1826; toured throughout the U. S.; also played in England and on the Continent. By reason of his fine form, noble presence, and natural genius, was preëminent in such parts as *Othello, Spartacus, Jack Cade,* and *Metamora.* A quarrel with Macready, the English tragedian, was taken advantage of by the populace at the time of the political "American" movement, and in May, 1849, when Macready was playing at the Astor Place Theater, New York, a bloody riot occurred, provoked by the partisans of the respective actors. Forrest announced his retirement, 1858, but played at intervals till 1871; thereafter gave public readings from Shakespeare. He left a fund to establish a home for aged and indigent actors.

Forrest, Nathan Bedford, 1821–77; American military officer; b. Bedford Co., Tenn.; became a real-estate broker and slave dealer in Mississippi, and later a cotton grower in Coahoma Co., Miss.; joined the Tennessee Mounted Rifles, June, 1861; raised and largely equipped a regiment of cavalry for the Confederate army, and was chosen lieutenant colonel; took a conspicuous part at Fort Donelson, and, as colonel, at Shiloh (Pittsburg Landing); was assigned to command of cavalry at Chattanooga, 1862; made brigadier general and placed in command at Murfreesboro. Commanded a brigade at Parker's Crossroads and at Chickamauga; promoted major general, November, 1863, and placed in command of the cavalry in N. Mississippi; was in command at the capture of Fort Pillow, 1864; promoted lieutenant general, February, 1865; surrendered at Gainesville, May, 1865; later, and till 1874, was president of Selma, Marion & Memphis Railway Company.

Förster (för'stĕr), **Ernst Joachim,** 1800–85; German painter and writer on art; b. Münchengosserstadt; was one of the founders of the school of which Kaulbach was the most distinguished pupil. Förster's hand is seen in frescoes in the Aula at Rome, in the Glyptothek and Arcade at Munich, and in the chapel of San Georgio at Padua, whose frescoes he restored. He wrote a large number of works on art.

Fors'ter, Johann Reinhold, 1729–98; German traveler and naturalist; b. Dirschau; pastor at Rassenhuben, near Dantzig, devoting his leisure to scientific studies. In 1772 he accompanied Cook on his second voyage, as naturalist, and on his return published "Observations Made During a Voyage Round the World." In 1780 became Prof. of Natural History at Halle.

Forster, William Edward, 1818–86; English statesman; b. Bradpole, Dorset; was a worsted manufacturer at Bradford; was member of Parliament from 1861 till his death; Under Secretary of the Colonies, 1865–66; had much to do with passing the Education Bill of 1870 and the Ballot Bill of 1871, and was a supporter of imperial federation. In 1875, was elected Lord Rector of Aberdeen Univ. Was Chief Secretary for Ireland, 1880–82.

Fort, fortification, usually inclosed and provided with flanking arrangements and accessory defenses, which generally are lacking in the smaller works known as redoubts. In the U. S. the military posts of the interior are known as forts, although generally without fortifications. See FORTIFICATION; FORTRESS.

Fort Ad'ams, fortification on Brenton's Point, entrance to Newport Harbor, R. I.; planned and built, 1828–38; is one of the few works of the system of seacoast defense in the U. S. designed to sustain a regular siege.

Fort Bra'dy, military post at Sault Ste. Marie, Mich.; is an important position, commanding the St. Mary's River and canal.

Fort Can'by, one of the defenses of the mouth of the Columbia River; on Cape Hancock or Disappointment, Pacific Co., Wash.

Fort Chip'ewayan, Hudson Bay post near the SW. end of Lake Athabasca, Canada; at the mouth of the Athabasca. Missionaries have long maintained an orphanage here with sixty to a hundred inmates, making the place the most populous white station in the Mackenzie River basin between Lake Athabasca and the Arctic Ocean.

Fort Church'ill, Hudson Bay post at the mouth of the Churchill River, Canada. The W. coast of Hudson Bay is low, with shallow water, and the only harbor available for large vessels at all stages of the tide is at Fort Churchill, where there is perfect shelter, an easy entrance, and six to eight fathoms of water.

Fort Dear'born, a fort erected, 1804–5, on the site now occupied by the city of Chicago. In 1812, Capt. Nathan Heald, at the head of a garrison of sixty-seven men and accompanied by some thirty settlers, abandoned the fort and made their way toward Detroit, but en route were attacked by an overpowering force of Indians, and most of the party were killed. The fort was destroyed by the Miami Indians, but was rebuilt in 1816, evacuated in 1823, reoccupied in 1828, and finally demolished in 1856.

Fort-de-France (fôr-dė-frôńs'), capital of Martinique, French W. Indies; on low land bordering Port Royal Bay, near the S. end of the island; was the principal port till supplanted by St. Pierre, which was destroyed by the eruption of Mont Pelée, 1902. The bay is defended by Fort St. Louis, an important post during the French and English wars. There is a small park containing a monument to the Empress Josephine, who was born near the place. Pop. (1901) 15,000.

Fort Dodge, capital of Webster Co., Iowa; on Des Moines River; 90 m. N. of Des Moines; has Tobin College, a Roman Catholic seminary, fine quarries of building stone, deposits of gypsum, coal, fire clay, potter's clay, and water lime, various manufactures, and one of the largest oatmeal mills in the state. Pop. (1904) abt. 15,000.

Fort Don'elson and Fort Hen'ry, works erected by the Confederates during the Civil War, in NW. Tennessee; the former on the left bank of the Cumberland, the latter on the right bank of the Tennessee; distant from each other about 12 m., and connected by a direct road. In February, 1862, a combined Union naval and land expedition moved against them. Admiral Foote compelled the surrender of Fort Henry, February 6th, but the garrison escaped to Fort Donelson; Gen. Grant besieged Fort Donelson, February 13th, and made an ineffective assault. Joined by Foote's fleet and reinforced to about 27,000 men, he projected a combined attack, but finally this was undertaken by the gunboats alone, which were compelled to retire, disabled. On the 15th the Confederates made a sally, but were driven back. Grant now made preparations for a general attack, but the Confederates, finding the line of siege complete, had decided to surrender. To this, however, Gen. Pillow and Gen. Floyd would not accede, and on the night of the 15th they escaped with some 2,000 men. On the 16th, Gen. Buckner surrendered unconditionally, and 65 cannon, 17,000 small arms, and about 1,400 prisoners came into Grant's possession. Total Union loss, 2,832.

Fort Duquesne (dū-kān'), erected, 1754, at beginning of French War, at junction of Allegheny and Monongehela rivers; occupied by French, who defeated force under Braddock sent out against it, 1755; abandoned and burned, 1758; rebuilt by Gen. Forbes and named Fort Pitt. Site now occupied by city of Pittsburg.

Fort Ed'ward, village in Washington Co., N. Y.; on the Hudson River; 28 m. N. of Troy; has a seminary and collegiate institute, and extensive manufactures, including iron, brass, paper, lumber, machinery, and stoneware. The first fortification here was built 1709; another and larger one called Fort Lyman was built 1755, but the present name was soon substituted in honor of Edward, Duke of York. Fort Edward was of importance during the old French and Indian wars, and during the Revolution was occupied in turn by British and Americans. Pop. (1905) 3,806.

Fortescue (fōr'tĕs-kū), **John,** abt. 1395–1476; English jurist; became sergeant at law, 1429; one of the king's sergeants, 1441; was Chief Justice of the King's Bench, 1442–60; escaped with Henry VI into Scotland, 1461; attainted of high treason, 1463; escaped with Queen Margaret to the Continent; pardoned by Edward IV, 1473. Wrote "On the Praises of the British Laws," in Latin, a masterly exposition of English law; and "The Governance of England," otherwise called "The Difference between an Absolute and Limited Monarchy, as It More Particularly Regards the English Constitution."

Fort E'than Al'len, military post established, 1893; near Essex Junction, Vt., about 5 m. E. of Burlington; designed to hold a large garrison, and to form one of the cordon of posts along the N. frontier of the U. S.

Fort Fish'er, strong earthwork on Federal Point, N. C., between the ocean and the Cape Fear River; erected by the Confederates during the Civil War to guard the mouth of the river. An unsuccessful attack was made in December, 1864, by Union land forces under Gen. Benjamin F. Butler and a fleet of ironclads under Admiral Porter. Another, January 13–15, 1865, was made by land forces under Gen. Alfred H. Terry and a fleet of ironclads. The army captured the fort after a desperate fight, in which the total losses on the Federal side were about 1,000; on the Confederate, from 2,000 to 2,500, of whom about 500 were killed or wounded.

Fort Foote, inclosed barbette work with exterior batteries; on the Potomac, 6 m. below Washington; on a commanding bluff of the Maryland shore; constructed during the Civil War, and formed the inner line of defense of the channel of approach by water to Washington.

Forth, river of Scotland, E. side; rises in two branches, the Avendhu and the Duchray, which unite at Aberfoyle; then passes, with many windings, through the most picturesque part of Scotland, by Stirling, and a little above Alloa it empties into the Firth of Forth; navigable for vessels of 100 tons to Stirling, and to Alloa for vessels of 300 tons; communicates with the Clyde by a canal 38 m. long. Has important fisheries of herring, whitefish, and salmon. In 1889 a great railway bridge, one of the most remarkable in the world, was erected across the Forth at Queensferry.

Fort Ham'ilton, fort on the E. shore of the Narrows, the principal entrance to New York Harbor.

Fort Han'cock, one of the strongest forts in the U. S.; on Sandy Hook, N. J.; designed to control the entrance to the lower New York Bay. Attached to the fort are grounds used in testing guns, armor, projectiles, etc.

Fort Hen'ry. See FORT DONELSON and FORT HENRY.

Fortifica'tion, the art of rendering a military position defensible against the attacks of superior numbers; also the work or works erected for that purpose. The art of fortification is usually divided into two branches—permanent fortification and field work or temporary fortification. Permanent fortifications are constructed to defend a position of permanent importance, and are made of durable materials. Field fortifications are intended to serve a temporary purpose, and the materials employed are those found ready at hand. The principles of the art are essentially the same in both. The origin of fortification goes back to the organization of society. The character of the works has conformed to that of weapons em-

ployed in the various ages of mankind. Thus among the wild tribes of remote times who were armed with clubs and weapons of stone, a wooden barricade or a bank of earth surmounted by a hedge was an efficient defensive work. The introduction of metal tools rendered these easy of destruction, and a wall of masonry was the next step in advance. As nations grew in power the height and thickness of these walls were increased. Some are said to have been 100 ft. high. The greater their height, the greater the difficulty of scaling and the more effective were the missiles thrown from them. Greater thickness provided more space on top of the wall for engines of war. The walls of Babylon are said to have been 70 ft. thick, built of two parallel walls with the intervening space filled with earth. A thin wall, to protect or cover the men on top, was built along the front part about the height of a man, with openings or embrasures through which stones and arrows were hurled against the enemy. To command the foot of the wall, brackets were built out, and upon these were placed parapet walls with embrasures. Towers projecting beyond the general face of the wall, to provide a line of fire parallel to it, were next added, the distance between the towers being a little less than the range of the weapons. Next the ditch about the fortification was introduced.

The invention and introduction of gunpowder caused a great change in all the methods previously employed. The high walls presented a too vulnerable object to cannon projectiles, and they had to be lowered. Space had to be provided for mounting of guns, and this was accomplished by throwing up a bank of earth against the interior side of the wall, and towers had to be greatly enlarged to receive the cannon, and became bastions. To prevent the walls from being breached from a distance, outworks were thrown up in front of them. The greatest advance at this stage was by the Italians, who in 1527 surrounded Verona by a bastioned work. The great German—sculptor, painter, and architect—Albrecht Dürer, was one of the first modern writers on the subject; his book is dated 1527. Other great writers were Daniel Speckle, a German born in Strassburg in 1536, which city he fortified; Errard de Bar-le-Duc, 1594; De Ville, 1629; Count de Pagan, 1645, and Vauban, 1633. The latter made many great and radical improvements, rebuilt 300 old fortresses, built thirty-five new ones, and besieged fifty-three. His great talent was displayed in adapting his works to the site, and he brought the system of bastions to a high degree of perfection.

A modern permanent fortification usually consists of an inclosure of earth and masonry, called the *enceinte* or body of the place, secured by a citadel within and strengthened by works on the exterior, called outworks. The mass of earth employed to cover the bodies of the defenders from the enemy's projectiles is called the parapet. It is raised upon another mass of earth called the rampart, *R* (Fig. 1). Outside the rampart is the ditch, *D*, which is made deep and wide enough to offer a serious obstacle to the enemy. Beyond the ditch is the glacis, *c*. The plan takes many forms to adapt it to the site, to admit the ditch to be swept by the fire of the defenders, and to give proper command of the ground to the front of the different sides. The main points to be attained in any fortification are: (1) to offer an obstacle to the advance of an enemy in a hand-



Fig. 1.

to-hand conflict; (2) to cover the defenders from the missiles or projectiles of the enemy; and (3) to thoroughly sweep with its fire all the ground within range on the exterior, including its own ditches. Many different methods of attaining this end have been proposed. There are, however, three principal systems. These are the "Tenailled" (Fig. 2), the "Bastioned" (Fig. 3), and the "Polygonal" (Fig. 4). It will be observed that the lines are straight in all of them. To make them curved would scatter the fire or concentrate it

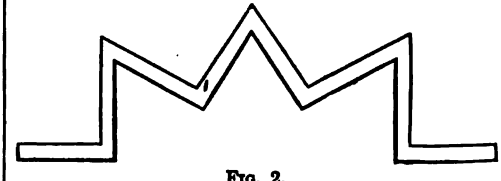


Fig. 2.

upon single points. The line of fire is always assumed to be perpendicular to the crest from which the firing takes place.

The tenailled trace, or ground plan, is shown in Fig. 2. It is simple, and it adapts itself well to the ground and provides for a cross fire upon the approaches. For the same length of parapet this plan incloses less space than either of the other systems. The great number and sharpness of its salients render its faces peculiarly liable to enfilade or reverse fires.

Fig. 3 shows the bastioned trace. The great distance between the flanks and the opposite

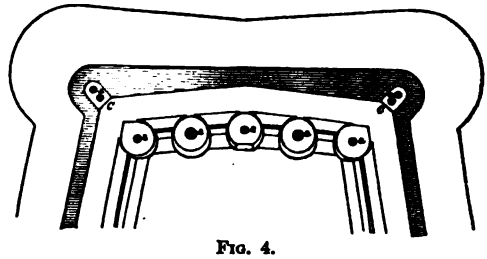


Fig. 4.

glacis exposes the masonry wall of the flanks to the curved fire of the enemy. To remedy this defect additional outer works were introduced. This system is one of the most complicated and elaborate, and the cost of construction is considerable. In the polygonal system (Fig. 4) the faces are but little ex-

posed to enfilade or reverse fires. For the same length of parapet more ground is inclosed than in either of the other systems. This system adapts itself better to irregular sites. Of the systems named, the polygonal has been the one most generally favored by the great nations. In field fortifications, which are constructed during the exigencies of war, the practical application of the principles of permanent fortifications are necessarily somewhat modified. They are usually hastily constructed of earth obtained by digging a trench, and are strengthened by such material as may be at hand, often by bags filled with sand or logs, pieces of timber, as may be handy. Obstacles are placed in front. One of the most commonly employed is the "abattis," formed of stout limbs of trees about 15 ft. long, with all

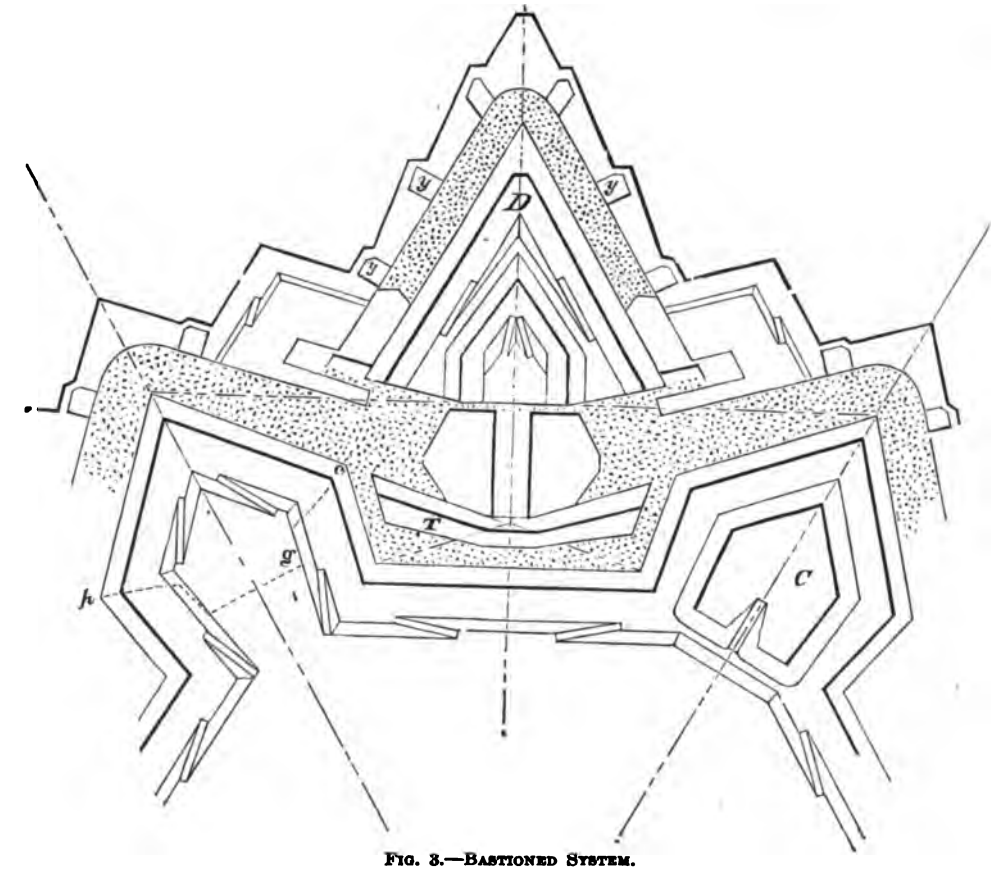


FIG. 3.—BASTIONED SYSTEM.



FIG. 5.

the small branches cut off and the large ones pointed and placed toward the enemy. Barbed fence wire is one of the obstacles of modern times used in field fortifications. A hasty intrenchment for infantry is shown in Fig. 5. See FORT; FORTRESS.

Fort Jack'son, pentagonal, bastioned, and casemated brickwork, with glacis and wet ditch, on the Mississippi, 78 m. below New Orleans, at what is known as the Plaquemine Bend. In conjunction with Fort St. Philip it defends New Orleans against attack from the river. The forcing of the passage of these works and their capture by the fleet of Farragut constituted the first great naval exploit of that commander.

Fort Lafayette', brick fortification, on an artificial island in the Narrows of New York Harbor, directly W. of Fort Hamilton. It was begun 1812, and was originally called Fort Diamond. During the Civil War it was used as a prison for political prisoners and for persons suspected of treasonable designs. The works were partially destroyed by fire, 1868, and the remaining buildings are now chiefly used for the storing of ordnance.

Fort Leav'enworth, post village of Leavenworth Co., Kan.; on the Missouri; 2 m. above Leavenworth; has a U. S. military prison, reservation, and infantry and cavalry school.

Fort McHen'ry, inclosed bastioned pentagon, with exterior batteries, on the W. side of the Patapsco River, forming one of the defenses of the channel of approach to Baltimore, Md.; is

an old work, built prior to 1812; an attack during the War of 1812–15 furnished the theme for the well-known words of "The Star-spangled Banner," by F. S. Key.

Fort Ma'rion, inclosed work at St. Augustine, Fla., begun by the Spaniards abt. 1650, and completed 1756; is the oldest fort in possession of the U. S. Govt. It is not of much value, but is carefully preserved as an object of historic interest.

Fort Mif'flin, one of the inner line of defenses of the port of Philadelphia, Pa.; on Mud Island, Delaware River, below the mouth of the Schuylkill; was attacked by a British man-of-war, October 23, 1777, and after a spirited resistance was taken, November 16th.

Fort Monroe', extensive bastioned fortification on Old Point Comfort, Va., for the defense of Hampton Roads and the water approach to Norfolk and the Gosport navy yard; stands on the N. side of the channel, Fort Wool (formerly Fort Calhoun) being on the S. side, about a mile distant. Fort Monroe is properly a fortress or fortified place (it is often called Fortress Monroe), as it incloses a large area, and contains within it a number of detached buildings—barracks for soldiers, storehouses, a portion of the workshops of an arsenal, the artillery school of the service, a chapel, etc.

Fort Moultrie (mō'trĭ), fortification on Sullivan's Island, at the entrance to Charleston harbor, S. C.; built on the site of a rude work of palmetto logs and earth, which was attacked unsuccessfully, 1776, by a British fleet under Sir Peter Parker. It fell into Confederate hands, December, 1860, and with the batteries on Morris Island fired the first guns of the Civil War—on the *Star of the West*, January 9, 1861.

Fort Niag'ara, inclosed work in Niagara Co., N. Y., at the mouth of the Niagara, the entrance to which river it commands. The old work of this name had a prominent part in the war with Great Britain, 1812–15, and was the scene of stirring events; was surprised and captured, 1813, when most of its garrison were slain.

Fort Pick'ens, inclosed casemated and bastioned pentagonal brickwork, on Santa Rosa Island, Pensacola harbor, Fla., which harbor and the U. S. navy yard it defends. In January, 1861, Maj. Adam Slemmer abandoned the small work, Fort Barrancas, opposite, and transferred his command to Fort Pickens, which he held until reënforced.

Fort Pil'low, a fort built in 1862 by Confederates under Gen. Pillow, in Tennessee, on the E. shore of the Mississippi, about 40 m. N. of Memphis. After the battle of Shiloh (April, 1862) the flanking movement of Grant's army up the Tennessee forced the Confederates out of this stronghold; in consequence, the Union gunboat flotilla was enabled to run down to Memphis, where it destroyed nine Confederate gunboats, and then the city capitulated (June 6th). Afterwards the fort was occupied by the Federals; was attacked and destroyed in 1864.

For'tress, permanent defensive work, larger than an ordinary fort, possessing great strength, and equipped to contain a large garrison and withstand a prolonged siege. Ancient fortresses differ radically from modern ones in that the attack and defense of the works were vertical before the introduction of guns throwing heavy balls horizontally—a change dating not earlier than 1500 A.D.—while since that time the attack and defense have been horizontal. The modern fortress is low, and not to be seen from afar; its grassy slopes are lost in the landscape. The ancient fortresses, from the time of the early empire in Egypt, as at El Kal or Abydos, to Pierrefonds, NE. of Paris, finished 1400 A.D., were lofty structures, crowning a height or isolated in a lake, lifting battlemented towers high above their surroundings. Before the introduction of breech-loading guns there were but four methods of attack: by escalade, *i.e.*, climbing, as with ladders, by forcing or surprising gateways, by mining underneath the walls, so as to throw them down, and by battering rams, the pickax, or other such methods of breaching the wall above ground.

Missile weapons were secondary in importance. Arrows and bolts were used to drive the defenders from the walls at the moment of assault, and to repel the assailants, and heavy stones and darts as large as iron-shod rafters were used to destroy battlements and wooden defenses of all sorts; burning missiles were used also to set fire to the stockades, palisades, and wooden galleries. The largest *pierrières* (stone-throwing engines) of the Middle Ages could throw a 300-pound stone perhaps 600 ft.; but not many of these in an hour, and with no exact aim; moreover, such a machine contained an enormous amount of solid timber, occupied a space of perhaps 800 sq. ft., and took many days to set up and adjust. The assailants had to crowd close under the walls to scale or to breach them, and the defense consisted of a steady shower of darts, arrows, stones, and unslaked lime, with burning arrows aimed at the wooden mantlets and scaling towers of the attacking party. Of the fortresses of the Middle Ages many remain in excellent condition; several in Syria, built by the crusaders, being almost intact; the great inclosed place at Villeneuve, opposite Avignon, retaining all its defensibility except for a breach or two in the walls; and the tower of Philip the Fair near by, and the walls of the city of Avignon itself, having needed and received but slight repairs. In the U. S. Fort Monroe was designed to be a fortress in the European sense.

Fort Schuyler (skī'lĕr), name given, 1776, to the old Fort Stanwix which stood on the site of the present city of Rome, N. Y. It was unsuccessfully besieged by St. Leger's Tories and Indians, 1777, and was destroyed by fire and freshet, 1781. Fort Stanwix was built in 1758, and cost the British £60,000. FORT SCHUYLER is also the name of a casemated

structure of gneiss rock on Throgg's Neck, where the East River widens into Long Island Sound; in conjunction with Fort Totten at Willett's Point, it commands the approach to New York harbor from the NE.

Fort Scott, capital of Bourbon Co., Kan.; on the Marmaton River; 100 m. S. of Kansas City; contains the Kansas Normal College, remains of old Fort Scott, Mercy Hospital, foundry and machine works, flour mills, woolen mills, paint and cement works, window-glass works, and a sorghum sugar factory. Coal and flag paving stone are found in the vicinity, and are shipped from the city. Pop. (1908) 15,025.

Fort Sher'idan, military post at Highwood, Lake Co., Ill., 22 m. N. of Chicago; is on a high bluff overlooking Lake Michigan; is the largest military post in the U. S.; occupies 640 acres; a site purchased by citizens of Chicago and presented to the Government.

Fort Sum'ter, historic defensive work at Charleston, S. C.; noted for being the place where the U. S. Civil War was begun, April 12, 1861, and as the scene of several severe military and naval conflicts. The work, begun 1829, is located on a shoal on the S. side of the entrance to the inner harbor, distant about a statute mile SW. from Fort Moultrie, and 3½ m. from Charleston City. S. Carolina having seceded, December 20, 1860, the entire force of U. S. troops in Charleston harbor, consisting of seventy-five enlisted men under Maj. Robert Anderson, was transferred (December 26th) from Fort Moultrie to Fort Sumter, which was unfinished, and had not received its entire armament. On January 9, 1861, the steamer *Star of the West,* with provisions and 250 Federal soldiers, made an attempt to reënforce the fort, but was fired into by the batteries on Sullivan's and Morris islands, and abandoned the enterprise. Maj. Anderson, though refusing to surrender as demanded by Gen. Beauregard, April 11th, was compelled to do so by the bombardment that began April 12th, and on the 14th marched out (with all the honors of war), and the Confederates took possession.

An unsuccessful attack on the fort was made April 7, 1863, by a naval force of ironclads under Rear Admiral Samuel F. Dupont. A bombardment by batteries established by the Federal land forces on Morris Island was begun August 17th, and resulted in the destruction of the batteries and the demolition of the walls on two of its faces; September 8th an assault was made by a naval column, which was repulsed with heavy loss. The Fort Sumter garrison later constructed additional shelters, galleries, and quarters within and under the ruins, and maintained possession until the final evacuation of Charleston and all its defenses, February 18, 1865. The work has been rebuilt on a modified plan, and mounts large guns *en barbette* and guns in casemate.

Fort Ticonde'roga, fort in Essex Co., N. Y., between Lakes George and Champlain; prominent in colonial and Revolutionary history; fort built by the French, 1755; headquarters of Montcalm, 1757; unsuccessfully assaulted by Gen. Abercrombie, 1758; occupied after a siege by Gen. Amherst, 1759; captured by Ethan Allen, 1775; retaken by Burgoyne, 1777, and again by Gen. Haldeman, 1780, but soon abandoned on each of the last two occasions. Now the site of a village, Ticonderoga, with lumber and manufacturing interests.



VIEWS OF FORT SUMTER FROM MORRIS ISLAND, AUGUST 16, 1863.

Fortu'na, Latin name of the goddess of good luck, worshiped at many places of Italy, Greece, and Asia Minor. Is most often represented holding in one hand a rudder, in the other the horn of plenty; sometimes also with a ball or wheel at or under her feet; was especially honored at Rome, where she had several temples and bore many surnames.

For'tunate Is'lands, ancient name for a group of supposed islands of the "ocean stream," whose genial climate is celebrated by Homer. The geographers identified them with the Canary Islands, but the term seems to have included the Azores, Madeira, and the Cape Verde group. The delightful climate of all but the most southerly of these justifies the name.

Fortuna'tus, hero of an old romance, the first known edition of which appeared in German at Frankfort, 1509. Fortunatus, after great sufferings, receives an inexhaustible purse and a wishing cap, which finally proves the ruin of him and his sons. Another popular character, Fortunio, is believed to have been at first identical with him. The story of Fortunatus was dramatized by Hans Sachs, "Der Fortunatus mit dem Wunschseckel," 1553, and by Dekker, "Pleasant Comedie of Old Fortunatus," 1600.

Fortunatus, Venantius Honorius Clementianus, abt. 530–600; Italian prelate and poet; b. near Ceneda; abt. 564 left Italy for France; for a time court poet to Siegbert, King of Austrasia; settled at Poitiers, where he became chaplain to Radegunde, queen of Clothaire I; abt. 592 was Bishop of Poitiers, and held the office till his death. He wrote numerous works in Latin prose and verse, including an epic poem on the life of St. Martin, and nearly 300 hymns, one of which, "Vexilla regis prodeunt" ("The Banners of the King Advance"), was adopted by the Church.

For'tune, Robert, 1813–80; English botanist and author; b. Berknick; employed in the botanical gardens of Edinburgh, Chiswick, and Chelsea; in 1842 was made collector of plants for the Botanical Society of London. Visited China several times; was author of "Three Years Wanderings in Northern China," "Two Visits to the Tea Countries of China," "Residence among the Chinese Islands," and "Yedo and Peking."

Fortuny y Carbó (fōr-tō'nē ē kär-bō'), **Mariano**, 1838–74; Spanish genre painter; b. Rēus, Catalonia; spent most of his life in Rome. His pictures sold for high prices during his lifetime, and are much sought by collectors in Europe and the U. S., where many of his principal works are owned. His canvas "Camels at Rest" is in the Wolfe collection, Metropolitan Museum, New York.

Fort Wads'worth, strong work on Staten Island which commands the entrance to New York Harbor at the Narrows, in conjunction with Fort Hamilton on the Brooklyn side. Fort Wadsworth proper is a triple casemate of granite at the water's edge, but the name is applied to the reservation generally, including Fort Tompkins on the top of the hill, Battery Hudson, and the continuous water batteries defending its passage.

Fort Wayne (wān'), capital of Allen Co., Ind.; at the confluence of St. Mary's and St. Joseph rivers, which here form the Maumee; 94 m. SW. of Toledo, Ohio; contains U. S. Govt. buildings, Concordia College (Lutheran), Fort Wayne College (Methodist Episcopal), St. Augustine Academy (Roman Catholic), Westminster Seminary, Art School, Conservatory of Music, Hope and St. Joseph's hospitals, Manual Training and High School, county courthouse, public library, several benevolent homes, and a number of public parks. There are extensive railway shops, foundries, machine shops, flour mills, and manufactures of hosiery, oil tanks, boilers, clothing, baking powder, wagons, and lumber. The French visited this locality abt. 1700; Fort Miami, a trading post, was erected soon afterwards; the English built a fort in the vicinity, 1760; Gen. Anthony Wayne located a government post here, 1794; first city charter granted, 1839. Pop. (1900) 45,115.

Fort Will'iam, a Canadian city at the head of navigation on Lake Superior. It is situated at the mouth of the Kaministiquia River at the point where three transcontinental railways come down to the lake. Immense quantities of grain pass through its elevators every year, and it has in addition large flour mills, foundries, and car shops. Pop. 18,000.

Fort William Hen'ry, fort in Warren Co., N. Y., near the head of Lake George; erected, 1755, by the British forces under Sir William Johnson. It became an important strategic point in the last French War in the colonies, and was captured in 1757 by about 9,000 French and Indians under Montcalm.

Fort Worth, capital of Tarrant Co., Tex.; on Trinity River, 32 m. W. of Dallas. Has grain elevators, flour mills, a cracker factory, foundries, tanneries, woolen mills, a cotton-oil mill, excelsior factory, car works, railroad shops, stock yards, and a large packing house. Pop. (1900) 26,688.

For'ty, number frequently used, like seven, mystically and symbolically in the Bible. Thus Moses was forty days in the mount. Christ fasted forty days.

Importance came to be attached to this number in the secular as well as the religious world. The alchemists fixed forty days as the period necessary for the development of the philosopher's stone and elixir of life; physicians looked for certain physical changes only at the expiration of forty days. In ancient England, forty days was the limit of the privilege of sanctuary; a tenant was obliged to serve his knight for forty days; members of Parliament could not be arrested till forty days after Parliament was prorogued, nor during a period of forty days before it was convened. To-day to constitute a House of Commons forty members must be present; formerly forty days was the time during which vessels carrying contagion were isolated on entering a port.

Fo'rum (plural **Fora**), name given to an open place in Rome, like the Greek *agora*, where the citizens assembled for business, for legal transactions, for the administration of justice, and for the sale and purchase of goods. With the growth of the city the necessities of the people required more than one forum, and convenience divided their fora into those devoted to public affairs and those which were more strictly markets or bazaars. The most of the fora of the former class was the Forum Romanum, sometimes called Magnum, and from its preëminence simply Forum. This was the earliest, and for a time the only one, and was situated in the valley between the Capitoline and Palatine hills. Immediately adjoining this a new forum was erected at great expense by Julius Cæsar, which was called

from him Forum Julium. This still failing to accommodate the increasing pressure of the business of the courts, Augustus constructed still another, which received from him the name Forum Augusti.

Still other fora were erected by the later emperors, partly to facilitate business, but chiefly to adorn the city. The most magnificent of which was the Forum Trajani, or Forum Ulpium, immediately adjoining the Forum Julium and Forum Augusti, and having connected with it the Basilica Ulpia and the famous Columna Trajani, still standing. The second class of fora was devoted to market transactions, and they derived their names from the articles sold in them, *e.g.*, *forum olitorium*, the vegetable market; *forum piscarium*, the fish market, etc. The word "forum" was also applied to villages or stations in the provinces of Italy (like the use of the term "courthouse" in Virginia), some of which grew in time to flourishing towns. Such were, among others less important, Forum Appii in Latium on the Appian Way; Forum Aurelii or Aurelium in Etruria; Forum Cornelii in Cispadane Gaul; Forum Gallorum in Cisalpine Gaul; Forum Julii or Julium in Gallia Narbonensis, and Forum Sempronii in Umbria.

Foscari (fŏs'kȧ-rē), **Francesco**, 1372–1457; doge of Venice, 1423–57; warred with the Duke of Milan, 1426, 1438, and 1452. The Venetians obtained possession of Cremona, Bergamo, and Brescia, but Foscari was deposed by the Council of Ten. His sufferings and those of his son, banished as a traitor, 1445, are the subject of Byron's "Two Foscari."

Fos'sa Maria'na, canal about 16 m. in length, cut by the Roman general Marius from the river Rhone to the Gulf of Stomalenine, where it terminated at a port called Fossæ Marianæ, near the modern village of Foz. The work was done in 102 B.C., and traces of it existed in the fourth century A.D.

Fosse (fŏs). See DITCH.

Fos'sil, body or any part or trace of an animal or plant buried by natural causes in the earth. The molds of shells, the impressions left by the feet of animals, implements of stone or metal, and other works of human art which have been accumulated naturally into rubbish heaps, are thus strictly fossils. Perhaps the marks of rain, wind, waves, and shrinkage through heat should be included. A few fossils have been preserved entire, like the elephants and rhinoceroses found encased in frozen mud and sand in Siberia. The relics are usually petrified, *i.e.*, rendered stony through the infiltration of mineral matter. Fossils show that there once existed animal and plant races now entirely extinct; that, as a whole, each successive period contained more highly organized structures than its predecessor; that tropical forms once flourished in the polar regions; that each epoch was characterized by peculiar groups. Hence, formations are identified by means of fossils.

Fossil Foot'prints, or **Ichnites** (ĭk'nīts), impressions left by extinct animals in walking over mud and sand which has since hardened into stone. These may have been made by invertebrates or vertebrates, such as crustaceans, insects, batrachians, reptiles, or mammals. By far the most important locality for fossil footprints is the valley of the Connecticut, where large numbers, representing a variety of species, have been found in the red Triassic sandstone. It is not probable that any of these tracks were made by birds, since no birds are known below the Jurassic, the so-called bird tracks having been made by Dinosaurs.

Fossil For'ests, popular name for assemblages of petrified tree trunks, *i.e.*, rocks having the form of tree trunks and being the effect of the replacing of vegetable tissue with mineral matter. The petrifying was generally with silica (sand), in which case the wood is said to be silicified. Few of these "forests" really deserve the name, as they generally consist of trees which have been carried far from their place of growth, buried in earth, there silicified, and later exposed by the washing away of the material which once surrounded them. Among celebrated fossil forests are those of Egypt near Cairo, of Nubia, of Silesia, and of the island of Antigua in the W. Indies. Other accumulations of silicified wood occur in the interior of Chile, in New Zealand, and in Abyssinia, while in the U. S. there are as great and remarkable collections of silicified tree trunks as any found elsewhere. On the banks of the Little Colorado, in Arizona, are silicified tree trunks of all sizes up to 6 ft. in diameter, perfectly preserved, but none in positions or places occupied in life. Sometimes they are simply replaced by white silica, which shows the woody structure as distinctly as it could have been seen in the living tree; in other cases the trunks are masses of solid jasper, looking like huge sticks of red sealing wax; in other cases still, the wood is opalized or agatized (petrified with opal or agate, respectively), or filled with chalcedony or crystallized quartz, stained with the most brilliant colors. A remarkable group of silicified trees, some of which are 12 ft. in diameter, was discovered in Napa Co., Cal., and a veritable fossil forest, in which the trees are standing erect, surrounded by volcanic débris, in large numbers and at several levels, is in Yellowstone Park.

Fos'ter, Birket, 1825–99; English landscape and genre painter; b. N. Shields; painted principally in water colors, and many of his pictures have been engraved; prolific illustrator of books and periodicals.

Foster, Stephen Collins, 1826–64; American song composer; b. Pittsburg, Pa.; taught himself music. His first published song was "Open thy Lattice, Love," 1842, and his last was "Beautiful Dreamer," 1864. Between these two he wrote nearly 200 songs, in most instances both words and music; many of them became very popular. Among them were "Nelly was a Lady," "Old Dog Tray," "Old Folks at Home" (for which he received $15,000), and the serenade "Come where my Love lies Dreaming."

Foucault (fō-kō'), **Jean Bernard Léon,** 1819–68; French philosopher; b. Paris; 1844 invented an apparatus by which electric light is used in optical experiments, microscopic researches, etc.; in 1845 became scientific editor of the *Journal des Débats.* He demonstrated the earth's rotary motion on its axis by the pendulum and gyroscope, 1851; was physicist to the Imperial Observatory, 1854, and member of the French Institute. In 1855 he obtained the Copley medal of the Royal Society for measuring the velocity of light.

Foucault Cur'rents, in electricity, currents named from Jean B. L. Foucault; are currents in the iron or other metallic parts of a dynamo, motor, or other machine, induced by the movement of the parts in question through a magnetic field, or by fluctuations in the field (as in the transformer, etc.). Within the masses of metal, closed circuits of low resistance are afforded, so that the currents generated are frequently of considerable magnitude. Loss of energy through Foucault currents is prevented by lamination of the parts subjected to induction, *i.e.,* by forming them in thin layers; these are fixed at right angles to the path of the induced currents, with insulating strips between them.

Fouché (fō-shā'), **Joseph** (Duke of Otranto), 1763–1820; French politician; b. Nantes; member of the Convention, 1792; voted for the death of Louis XVI; infamous for his share with Collot d'Herbois in the butcheries at Lyons; Minister of Police, 1799; dismissed by Napoleon, but recalled in 1804; created Duke of Otranto, 1806. Napoleon again dismissed him, 1810; made him Governor of Illyria, 1813, and police minister a third time on returning from Elba, 1815. Fouché was head of the provisional government after Napoleon's second abdication; again made Minister of Police by Louis XVIII; ambassador to Dresden, 1815; exiled and deprived of office by the decree of January, 1816, against regicides. His "Memoirs" are spurious.

Fould (fōld), **Achille,** 1800–67; French statesman; b. Paris; member of Chamber of Deputies, 1842, 1846; of Constituent Assembly, 1848; Legislative Assembly, 1849; Minister of Finance, 1849–52; Minister of State, 1852–60; again Minister of Finance, 1861–67.

Foul in the Foot, contagious disease of sheep, characterized by ulcers and granulations between the toes. Caustic and stimulant applications, such as oil of turpentine, followed by tarry applications, are generally curative.

Fou'lis, Robert and Andrew, Scottish printers; b. Glasgow—Robert, 1707; Andrew, 1712. Robert was a barber and Andrew aimed for the ministry, but, 1740, the former established a printing press; three years later became printer to the Univ. of Glasgow, and, 1743, the brothers entered into partnership. Andrew d. 1775, and Robert, 1776. They made fortunes by printing, and lost them in founding an academy of painting and sculpture in Glasgow, the paintings being sold by auction, 1776. Their editions of Greek and Latin classics, especially those of Homer and Horace, were noted for accuracy and elegance.

Founda'tion, in its widest legal signification, the establishment of a corporation of any kind. In this sense the sovereign or state is said to the founder of all corporations, since their original creation is due to royal charter or legislative grant, express or implied. In its narrower, yet more usual and important use, the word means the establishment of eleëmosynary or charitable corporation or institutions by private endowment; and it is sometimes, though less commonly, by a natural transfer of application, used to indicate the endowment itself.

Foundation, a substructure designed to preserve a building from unequal settling and consequent cracks, dislocations, and ultimate collapse. Construction comprises preparing the bed, laying the footings, or lower courses, and building the foundation walls quite or nearly to the level of the ground. The principle is, whenever the bed is of yielding nature, so to enlarge the base as to reduce the pressure within the safe limit. Hard rock, gravel, and sand, when confined, afford unyielding foundations, but rock partly disintegrated is more yielding than hard clay, and sand unconfined and saturated with water is hardly more stable than water. Foundations in rock require that the surface, if sloping, be cut into steps, and thus made horizontal, that soft rock be removed and holes fitted with cement or arched over, and that the bed should be drained. Hard gravel will bear a pressure of 5,000 lbs. to the square foot. It is excavated below the frost line (2 to 6 ft., according to climate), and the trenches must be drained to secure an equal bearing. The footings have a spread of fifty per cent, as also on sand foundations. Sharp sand, either dry or wet, if confined, is free from lateral movement. Footings may be large, flat stones, laid dry for light structures, but covering the bottom of the trench, which is carried below frost. In beds of quicksand the site should be surrounded with sheet piling and a platform of concrete made.

Foundations on compressible soil divide themselves into pile and platform foundations. Piles are sand piles, or rigid piles of wood or iron. Sand piles are columns of damp sand rammed into holes 6 or 8 in. in diameter bored in the bottom of the trench 6 ft. deep. The load is distributed laterally as well as vertically. The function of a wooden pile is either to transfer the downward pressure to a stratum capable of bearing, or to support the load by the friction of its surface against the soil. A friction pile can sustain scarcely one fifth the load of a pile driven to a solid bearing. For piles driven to a solid bearing Rankine allows 1,000 lbs. to the square inch of head surface. Concrete piles in holes bored in soft soil may be carried down to a solid substratum. Platform foundations of timber, concrete, inverted masonry arches, etc., distribute the pressure over a wider area than the building covers, and prevent any part from settling more than

another. Great buildings are erected on treacherous soil by piling alternate layers of steel rails crosswise on a concrete base with I-beams on top to bear the masonry or iron columns, the whole being then buried in concrete. Coffer dams are temporary dams built around the site of a foundation under water. The water is pumped out of the inclosure so that the bed can be prepared and the foundation built. For foundations in deeper water open cribs are used, boxes open at the bottom except for a shelf for a load that sinks the crib, or caisson. The mud of the bottom is dredged until a firm bearing is reached, when the crib is filled with concrete. For still deeper foundations the pneumatic caisson must be employed, an inverted box from which the water is expelled by compressed air to enable laborers to excavate. See MASONRY.

Foun'der, inflammation primarily attacking the *laminæ* of the horse's foot, *i.e.*, the bony layers from which the hoof is formed. It may follow overdriving, exposure to cold when perspiring, overfeeding, or giving food or drink too soon after hard work; long-continued driving on pavements or on frozen ground and bad shoeing are fruitful causes. The fore feet are usually affected alone, but the fore legs and chest muscles sometimes share in the disease, and these muscles undergo atrophy (chest founder) through its long continuance. The disease resembles rheumatism. Bleeding is admissible in a young, strong horse suddenly foundered. The shoes should be taken off, the hoof covered with a hot poultice, the stall littered heavily, and in severe cases the horse slung up from the floor. After the acute stage is over the horse should be put to pasture, and allowed to run as long as he can be spared; except in severe weather, when he should be housed. A foundered horse can be detected by his mincing gait, by his resting his fore foot upon the toe, by a hot or contracted hoof, and by delicate signs recognized with difficulty by any except practiced observers. For an established founder there is no possible cure.

Found'ling Hos'pital, an institution maintained by government appropriations or by private or sectarian associations for the support of children abandoned by their parents or guardians. Such children are known as foundlings, the cause of their desertion in most cases is illegitimate birth, though some are abandoned by parents unable to provide for them. The necessity of providing for such children, and restraining infanticide, led to the establishment of foundling institutions by most civilized nations. As early as the sixth century a species of foundling hospital existed at Treves, where a marble basin was located in front of the cathedral, in which parents could deposit children they wished to abandon, the care of such foundlings being given by the bishop to members of the church. At Rome, and at Anjou, France, similar institutions existed at this early date, and during the succeeding centuries nearly all the larger cities of Europe established them.

After 1789 the French Republic assumed the charge of its foundlings, and an imperial decree, 1811, continued the arrangement by which foundling hospitals had become government institutions and the foundlings, children of the state. In Russia, all foundlings are the property of the government, and the army and navy are largely recruited from them. Owing to the prevalence of infanticide in China, a foundling hospital was established abt. 1856 in Canton. In the foundling hospital in Rio de Janeiro all the male children are apprenticed at maturity to trades, and the girls are given education along domestic lines. In Great Britain the boarding-out system has been largely approved, but in the U. S. it has been the occasion of much cruelty, leading to criminal prosecutions, and hence the care of foundling in institutions is the universal system.

Foun'tain, any spring of water, now generally applied to famous or historic springs, as the fountain of Arethusa, of Cyane, of Bandusia, or of Vaucluse. More often it designates an artificial basin and jet for the flow of water from aqueduct pipes. Fountains are designed both for use, and for decoration, often being elaborately fashioned. Drinking fountains for man and beast are provided in modern cities by public appropriation or private gift; in Oriental lands their erection is deemed an act specially to be rewarded in paradise.

Fountain of Youth, mythical spring which, according to Indian stories of the sixteenth century, existed in a country sometimes called Bimini; the waters, it was said, had the power of healing the sick, restoring the aged to youth, and conferring immortality. The story was current in the W. Indies and Central America, and Bimini was described as a beautiful island or region toward the N. The Spaniards supposed it to be one of the Bahamas, and later Florida, a region near the Mississippi, or even Mexico. Ponce de Leon sought for the fountain in Florida, 1512 and 1521, and it was one of the objects of the later expeditions of Narvaez and Soto. Similar myths have been recorded in the Old World.

Fouqué (fō-kā'), **Friedrich Heinrich Karl** (Baron de la Motte), 1777–1843; German author; b. Brandenburg; served in the Prussian army, and was wounded at Kulm (1813). His novels, epics, and dramas are remarkable for originality; they chiefly depict the ideal chivalry of the Middle Ages, and evince his admiration of ancient Scandinavian and Germanic poetry. His most celebrated romances are "Undine," "Sintram," and "Thiodolf."

Fouquet, Nicolas (Marquis de Belle-Isle), 1615–80; French Minister of Finance; b. Paris; early entered the public service, and, 1650, became Procurator General of the Parliament of Paris; and as he promoted the interests of Anne of Austria and Mazarin, they had him appointed Superintendent of Finances. He amassed a large fortune, and spent about 18,000,000 fr. on one of his chateaux. In this he brilliantly entertained Louis XIV, in 1661, who had him imprisoned for life in the castle

of Pignerol, on a charge of peculation and treason.

Fouquier-Tinville (fō-kē-ā' tăn-vēl'), **Antoine Quentin**, 1747–95; French revolutionist; b. Hérouel; after a checkered and disreputable career, during which he was Procurator at the Châtelet and police clerk, he became an agent for the police. On the establishment of the Revolutionary Tribunal, March, 1793, he was made Public Accuser; and till July 28, 1794, he indiscriminately dispatched thousands to the guillotine, on which he perished himself, after ten months' imprisonment.

Fourcroy (fōr-krwä'), **Antoine François** (Comte de), 1755–1809; French chemist and politician; b. Paris; Prof. of Chemistry at the Jardin du Roi, 1784–1809; admitted to the Academy of Sciences, 1785; member of the National Convention, 1792, and of the Committee of Public Safety, 1794; of the Council of Ancients, 1795; Minister of Public Instruction, 1802. Author of "System of Chemistry" and "The Philosophy of Chemistry."

Fourdrinier (fōr-drĭ-nēr') **Machine'**, a machine for making paper in a continuous web, perfected in 1804 by Henry and Sealy Fourdrinier, London paper manufacturers, who purchased the English patents of the machine invented by Louis Roberts in 1799. The first Fourdrinier machine in the U. S. was set up in 1827.

A Fourdrinier machine receives the strained paper pulp as it is discharged from the vat on an endless wire cloth, generally from 32 to 40 ft. long, and of varying width, according to the size of the sheet of paper to be made. This wire cloth, made of fine brass wire with its meshes varying from sixty threads upward to the inch, is supported on a series of small brass rolls of small diameter in order to preserve a uniformly even surface. These tube rolls are supported on an iron frame to which a violent lateral motion is given by a device known as the "shake." This is done to cause the fibers as they enter upon the wire to interlace and form a sheet nearly as strong in one direction of its texture as another. A cylindrical framework of brass, called a "dandy roll," covered with fine wire cloth, next presses the moisture from the wet layer of pulp, and also impresses the "watermark" by means of designs soldered to the exterior wire covering of the roll, which thins the sheet wherever it touches or indents it. "Laid" paper is watermarked at equidistant intervals; paper which is not so watermarked is known as "wove." A further amount of moisture is extracted from the pulp layer by a suction process. The paper is then transferred to couch rolls which are "jacketed" with woolen felt, passed between press rolls, and then passed over the numerous drying cylinders, being pressed against their heated surfaces by means of a felt. The paper is then passed between a series of polished rolls or calenders to give it a smooth surface, wound on reels, and sent to the cutters to be divided into sheets.

Fourier (fō-rē-ā'), **François Marie Charles**, 1772–1837; French Socialist; b. Besançon; discharged from the military service, 1795, through ill health. In 1831, when the social schemes of Saint-Simon and Robert Owen were much discussed, Fourier attracted attention by his savage attacks on these reformers in his "Pieges et Charlatanisme des Deux Sectes Saint-Simon et Owen, Promettants l'Association et Progrès," and among his disciples were Mme. Clarisse Vigoreaux, Victor Considerant, Cantagrel, Hennequin, and Mennier. In England and the U. S., Fourierism found adherents in Hugh Doherty and Albert Brisbane, and practical experiments attempted both in France and the U. S.; all failed.

The fundamental principles of Fourierism are: (1) all harmonies of the universe grow out of a uniform and regular order, denominated the law of the series; (2) all beings are kept in their true sphere, not by external force, but by internal attraction; (3) the universe, being everywhere the same, must in every sphere repeat itself, or be analogous. These principles were of general application, but Fourier carried them out chiefly in social science. His analysis of human nature was by a threefold division: man's physical nature, his moral nature, his intellectual nature. The object of all his physical desires is sensuous enjoyment; of his moral, mutual affection; of his intellectual, order and association. He taught that the association of the three principal agents of production—capital, science, labor—would prepare the way for this true society. A township of abt. 1,800 persons, Fourier regarded as the germ of larger combinations, which would gradually extend over the globe.

Fourier, Jean Baptiste Joseph (Baron), 1768–1830; French scientist; b. Auxerre; teacher in the Polytechnic School in Paris, and, 1798, member of the Scientific Commission in Egypt. By draining the marshes of Bourgoin as prefect of the department of Isère under Napoleon, he freed more than forty communes from pestilential malaria. Jointly with Cuvier he was perpetual secretary of the Academy of Sciences. Principal works, "Analytical Theory of Heat" and "Analysis of Determinate Equations."

Fournet (fōr-nā'), **Victor**, 1801–69; French scientist; b. Paris; rendered great services to dynamical geology, metallurgy, and mineralogy; demonstrated "Fournet's law," establishing the exact order of the metals as regards their "sulphurability." Was an industrious meteorologist and observer; introduced great improvements in the treatment of lead ores.

Fourneyron (fōr-nā-rōn'), **Benoît**, 1802–67; French inventor; was an engineer in the mines of Creuzot, and invented the turbine water motor, for which he received in 1834 the prize of 6,000 fr. from the Academy of Sciences.

Fourth, in music, an interval comprising four degrees of the scale, or the distance, *e.g.*, from *C* to *F*, *D* to *G*, etc. Fourths vary in quality or compass according to their place on the scale, numbering from four to six semitones. They are threefold, *viz.*: the perfect, containing two whole tones and one semitone;

the diminished or imperfect, one whole tone and two semitones; and the augmented, three whole tones. In harmony, the fourth is regarded as a consonance when it occurs as the complement of the perfect fifth, as in the second inversion of the triad. In other cases it is treated as an imperfect dissonance.

Fourth Estate', term first bestowed in Germany on the people standing politically and socially below the third estate, or citizen class. From the fourteenth century to the end of the eighteenth the representative assemblies in France were made up of three estates: the clergy, the nobility, and the burghers or citizens. In the French Revolution of 1789 a class below that of the citizens became prominent; and early in the nineteenth century it became evident that henceforth this class would be a distinct political power. Louis Philippe, the "Citizen King," was regarded as the personification of the third estate, and his overthrow was largely brought about by the stratum of society still lower. Louis Napoleon, by universal suffrage, established his power mainly on that of the fourth estate. Since the Revolution of 1848 this class has everywhere received more or less power, mainly through the extension of the suffrage, and has been an element of growing importance. The fourth estate has strong feelings on questions involving the good of humanity; and, though incapable of nice discriminations, it often turns the political scale by its earnestness and energy.

Fowl, word which, in its original meaning as a synonym of "bird," is antiquated and nearly obsolete, except as to birds of the subclass Cursores and order *Gallinæ*. This order contains, besides the common domestic fowl (*Gallus domesticus*), the peacock, guinea fowl, turkey, etc.

The domestic fowl was well known to the Greeks; to the Romans, who regarded it as sacred to Mars; to the Egyptians, as their wall paintings show; to the Etruscans, and to the ancient Britons also. There are innumerable breeds and varieties, among which are the Dorking, the game fowl, the black Spanish, the tall Chinese breeds, the Polish, the Crèvecœur, the Houdan, the little Bantams, the Leghorn, etc. According to tradition the cock was the national emblem of the ancient Gauls; after the Revolution it was placed on the ensigns of France. By artists it is introduced among the emblems of Christ's passion, in allusion to St. Peter's sin, and it is St. Peter's emblem. Among the early Christians it was represented on tombs as an emblem of the resurrection—the herald of light after the night of death; also as a symbol of vigilance. See POULTRY.

Fow'ler, Samuel, 1799–1844; American mineralogist; b. near Newburg, N. Y.; licensed as a physician, 1800, and practiced at Hamburg, N. J.; removed to Franklin, N. J.; served in the State Senate and was in Congress, 1833–37. As a mineralogist and geologist he was regarded as among the first in the country; was a member of the Geological Society of Pennsylvania and of the New York Lyceum of Natual History; honorary member of many scientific societies. The rare mineral fowlerite was discovered by and named for him, and the iron and zinc ore, franklinite, was so called by him.

Fowler's Solu'tion, named from Dr. Thomas Fowler, of Stafford, England (1736–1801), its inventor; solution of potassium arsenite (arsenite of potash) in water, flavored and colored with compound tincture of lavender. Is used in many skin diseases and fevers and resulting morbid states, and is sometimes useful in epilepsy and neuralgia.

Fox, Charles James, 1749–1806; British statesman; b. London; second son of Henry, Lord Holland; elected to Parliament, as a Tory, for Midhurst, 1768; made a Junior Lord of the Admiralty, 1770; Lord of the Treasury, 1773–74; from that time stood with Burke and the Liberals; foretold the defeat of the British forces in the American Revolutionary War. In 1780 he was returned to Parliament for Westminster; Secretary of State for Foreign Affairs, 1782, and again, in the Portland ministry, 1783; introduced a bill for the relief of the inhabitants of British India, and, on its defeat, resigned. Reëntering Parliament for a Scottish burgh, he became the leader of the Liberal Party; aided in the prosecution of Warren Hastings, supported Pitt in his Continental policy, and Wilberforce in his efforts to abolish the slave trade. During 1797–1802 he absented himself from Parliament; became Secretary for Foreign Affairs under Lord Grenville, 1806. He left an incomplete "History of the Reign of James II."

Fox, George, 1624–91; founder of the Society of Friends; b. Leicester, England; apprenticed to a shoemaker, but at nineteen abandoned his occupation and took up a wandering ascetic life; began as a preacher, 1648, and traversed all England, making many converts; advocated virtue, charity, love of God, and a reliance on the inward motions of the spirit, by which, and not by Scripture, he asserted, "opinions and religions are to be tried." In 1655 he was examined as a prisoner before Cromwell, who ordered his release. In 1671–73, visited N. America; 1677, went to Holland, where he preached with success; and, 1684, again preached there and in Germany. His published works (collected in eight volumes) are numerous and curious.

Fox, name of the genus *Vulpes* of the family *Canidæ*; members of this genus are externally distinguished by a slender muzzle, vertical pupil, and long bushy tail. The most familiar species is the common or red fox of Europe and N. America, embracing several varieties, of which the most characteristic is the prairie or long-tailed fox of the SW. U. S. Another related species, of smaller size, is the swift or kit fox of the W. prairies. A third species of the same genus is a native of the Arctic zone, and, among other marked characters (features), has hairy feet, whence it is called *Vulpes lagopus*. The genus *Vulpes* is closely related to *Canis*. Another genus (*Urocyon*) has much external similarity to *Vulpes*, but is distinguished from it by several important anatomical characters. It is peculiar to N.

America, and embraces a single well-determined species (*Urocyon virginianus*); but there is an



American Red Fox.

insular and tropical race which is much smaller, and has been considered as a distinct species, and named *Urocyon littoralis*.

Foxe (or **Fox**), **John**, 1517–87; English church historian; b. Boston, Lincoln. Entered Oxford, 1533; chosen a Fellow of Magdalen College, 1543; became a Protestant, and was expelled from his college (1545) for heresy; was tutor to children of Earl of Surrey, 1547–53; was ordained deacon by Ridley, 1550; fearing persecution under Queen Mary, he retired to the Continent (1554), and lived in deep poverty at Basel; returned in 1559, became a prebendary in Salisbury Cathedral, 1563; interceded unavailingly for Anabaptists condemned to be burned, 1575. He is chiefly known as author of the "History of the Acts and Monuments of the Church," commonly called "Foxe's Book of Martyrs," which has had many editions.

Fox'es, tribe of N. American Indians, belonging to the Algonquin family, noted in history as turbulent, daring, and warlike; living in the vicinity of Lake Winnebago or along Fox River, Wis., when they first became known to the whites (abt. 1670). Their own name for themselves was Meshewakihug ("red earth people"), and other Algonquin tribes called them Utagamig ("people of the other shore"). They were intimately related to the Sauk, or Sac, tribe, and the remnant of the two tribes now number less than 1,000, on reservations in Iowa and Oklahoma.

Fox'glove. See Digitalis.

Fox'hound, variety of dog, bred principally in Great Britain and Ireland, and by its keenness of scent, speed, and endurance, adapted to fox-hunting. The foxhound is from 20 to 22 in. high, close haired, straight limbed, with large thin ears, and is preferably white clouded with black and tan. It is said to have been produced by crosses between the bloodhound, greyhound, and bulldog, but, however this may be, the breed is now well established.

Fox-hunt'ing, a national sport of Great Britain; engaged in to some extent in the U. S. The fox is followed by a pack of from forty to 120 dogs, and by men and women on horseback. As they ride in the chase the party are under the charge of a master, the hounds being in the care of a huntsman and whippers in or "whips." The bolder members of the hunt leap their horses over fences, gates, and hedgerows; and all feel at liberty, when necessary, to rush through fields of grain and other growing crops. The fox is not shot, but when caught by the dogs is killed, and his "brush" (tail), "pads" (feet), and "mask" (face) are cut off and given as trophies to those who may be present, or "in at the death," as it is called. The flesh is cut up and given to the dogs, to be devoured on the spot.

Fox-Kane, Margaret, 1836–93; American spiritualist "medium"; b. Bath, Canada. In 1847 the Fox family removed to Hydeville, N. Y., and soon mysterious rappings were heard in the house, which were attributed to spirits. At Rochester, whither Margaret and her sister, Catharine, went to visit another sister, Leah, the rappings began again, and the three sisters were induced to hold *séances*, at which they professed to reveal mysteries and forecast events, the questions asked being answered by rappings. Their fame so increased that they were induced to travel, and they gave many *séances* in the U. S. and Europe. In 1856 Margaret Fox became acquainted with Elisha Kent Kane, the Arctic explorer, and later claimed to be his wife. At the time of her alleged marriage she withdrew from public life, but Catharine continued the *séances* till abt. 1888. In that year Margaret published an "exposure," in which she declared that the rappings had been produced by a dislocated big toe on one of her feet, but later she retracted it.

Fox Riv'er (Indian **Neenah**), stream rising in Green Lake Co., Wis.; flows S. and SW. to within 1½ m. of the Wisconsin, with which it is connected by a canal at Portage City; then flows N. and NE. to Green Bay, where it empties at the city of that name into Lake Michigan; length about 200 m. The navigation of this river has been improved by jetties, and a canal between it and the Wisconsin forms the connecting link of the great water route which leads from the Mississippi by way of Wisconsin River, the Upper Fox, Lake Winnebago, and the Lower Fox to Green Bay, and thence by way of the Great Lakes to the Atlantic.

Fox Shark, or **Thresh'er**, *Alopias vulpes*; a shark of the Atlantic and Pacific; 12 to 18 ft. long, the tail about as long as the body; food consists of small fishes.

Fox Ter'rier. See Terrier.

Foy (fwä), **Maximilien Sebastien**, 1775–1825; French soldier; b. Ham; entered the army, 1791; became general of division, 1810; protected the retreat at Salamanca, 1812; distinguished in later campaigns; wounded at the battle of

Orthez (1814) and at Waterloo (1815), where he commanded a division. As a member of the Chamber of Deputies (1819–25) he became "the national orator" by his defense of constitutional liberty. As he died poor, 1,000,000 fr. were raised in a few days by subscription for his family. His speeches were published, 1826, and his unfinished history of the Peninsular War, 1827.

Fra Angel'ico. See ANGELICO, FRA GIOVANNI.

Frac'tions, in arithmetic, a fraction is one or more of a number of equal parts into which a unit or whole number is divided; also, the expression indicating one or more such parts. When the unit or whole is divided into two equal parts, each is a *half*; when into three equal parts, each is a *third*; and so on. Thus *one half, two thirds, four ninths*, etc., are fractions: they may be written ½, ⅔, ⅘, etc. A fraction consists of a *denominator*, which shows how great the parts are, and a numerator which indicates the number of these parts. In the fraction ⅚ (read *five sixths*) 6 is the denominator and 5 is the numerator.

Fractions are divided into two classes—*vulgar* or *common fractions* and *decimals*. Vulgar fractions are those in which the denominator is expressed; decimals are those in which the denominator is simply indicated. The denominator of a common fraction may be any quantity whatever; the denominator of a decimal is always some power of 10. The denominator of a decimal may be written out in full, in which case it is a decimal fraction, which differs in no respect from a common fraction. Vulgar fractions are expressed by writing the numerator over the denominator, with a line between them as ⅞. This is one of the methods of indicating division; a fraction is, in fact, equivalent to the quotient of the numerator by the denominator.

The two parts of a fraction are called *terms*, and according to their relative values the fraction is said to be *proper* or *improper*; if the numerator is less than the denominator, the fraction is *proper*; if the numerator is greater than the denominator, the fraction is *improper*. A proper fraction is always less than 1, and an improper fraction is always greater than 1. It may happen that the terms of a fraction are equal; in this case the expression is equal to 1, and is fractional only in *form*. Fractions are *similar* when they have a common denominator—that is, when they have the same unit; they are *dissimilar* when they have different units. Thus ⅗ and ⅘ are similar—⅗ and ⅔ are dissimilar. *Fractional expressions* are those that contain a fraction in any form. They may be mixed, complex, or compound. A mixed fraction, or mixed number, is composed of an integral and a fractional part, as $3\frac{1}{8}$, $5\frac{3}{7}$. A complex fraction is one in which at least one of the terms is fractional, as $\frac{3\frac{1}{2}}{5}$, $\frac{2\frac{1}{4}}{3\frac{1}{2}}$, $\frac{3}{5\frac{1}{7}}$. A compound fraction is a fractional part of a fraction or mixed number, as ½ of ⅔, ⅓ of $5\frac{1}{4}$. Any one of these may be reduced to the form of a simple fraction—that is, to a form in which both terms are entire. In algebra a fraction is any indicated quotient of two quantities; also, the expression by which the quotient is indicated.

Frac'ture, a disruption or separation between the parts of a bone or cartilage, produced by external violence or the sudden forcible contraction of muscles. The fracture is simple when there is no external wound; compound when there is lesion (wounding) of the surrounding soft parts; and comminuted when the bone is broken into many fragments. A green-stick fracture is the bending and partial breaking of a soft bone; it is most frequent in children.

The bones most liable to fracture are those near the surface, like the clavicle (collar bone), tibia (main bone below knee), and skull; or such as, like the radius (larger bone in the fore arm), are likely to receive the weight of the body during a fall. Old age, caries (bone ulceration), and cancerous or scorbutic (scurvylike) diseases, predispose to fracture.

The physiological symptoms of fracture are pain and inability to move the limb; the physical characters (effects) are unnatural mobility of the parts, change in the length, direction, or form of the limb, and a sound as of crackling fire when the broken fragments are moved upon each other. The treatment is to reduce or set the fragments, and keep them at rest and in close contact, by means of a splint which usually consists of a piece of wood, leather, pasteboard, gutta-percha, metal, or other material. In many cases surgeons use bandages stiffened with gypsum, starch, dextrine, or gum arabic.

Fra Diavolo (frä dē-ä'vō-lō), "Devil's brother"—Italian sobriquet of MICHELE PEZZA, a Calabrian goatherd, 1760–1806; b. Itri; became successively a stocking weaver, a soldier, a monk (with the name of Fra Angelo), and the leader of a band of atrocious robbers. He took service in 1799 against the French, and held a colonel's commission, but was captured and hanged as a robber, notwithstanding his pardon and commission from the King of Naples. The "Fra Diavolo" of Auber's opera has little or nothing in common with the historical character.

Fragonard (frä-gō-när'), **Alexander Evariste,** 1780–1850; French historical painter and sculptor; son of Jean Honoré Fragonard; b. Grasse; Legion of Honor, 1819; one of the chief "classicists of 1830." His frescoes are in the Louvre, Luxembourg Palace, and Versailles Museum; other works in museums at Orleans and Blois.

Fragonard, Jean Honoré, 1732–1806; French genre and portrait painter and engraver; b. Grasse; won the Grand Prix de Rome, 1752. His work forms a sort of connecting link in the transition from the painting of the eighteenth century to the classicism of the early part of the nineteenth. His pictures are in the museums at Rouen, Nantes, Versailles, Lille, Amiens, Nancy, Marseilles, St. Petersburg, and Madrid, and in the Louvre.

Fra Moreale (frä mō-rā-ä'lā), so called because he was once a brother in the order of

St. John in Jerusalem; the title of Montreal d'Albano, a gentleman of Provence who distinguished himself as a condottiere in the service of Louis I, King of Hungary, in his Neapolitan wars (1347-51). After the close of the wars he entered on a course of wholesale brigandage. Being finally driven from Naples, he raised a large company of freebooters, with which he marched against one and another of the petty rulers of Italy. He became the terror of Italy. Bulwer's picture of him in "Rienzi" is not exaggerated. Siena was forced to give him provisions and free transit, Florence to pay him 28,000 fl., and Pisa 16,000. Montreal contemplated the establishment of a permanent dominion, perhaps with Rome itself for his capital. With a small force he went to Rome, where he was arrested by command of Cola di Rienzi, and beheaded, August 29, 1354.

Franc, monetary unit in France, Belgium, and Switzerland. The first coins having this name were struck under John the Good of France, 1360; they were of fine gold, and were worth one pound (*livre*). The first silver francs, coined by Henry III, 1575, had a current value of 20 sous. On the adoption of the decimal system (1795) the franc was chosen as the monetary unit of France, being divided into *décimes* (tenths) and *centimes* (hundredths); it had a legal weight of 3.215 pennyweights, nine tenths fine (*i.e.*, $\frac{9}{10}$ of the coined metal was silver); coins were also struck of 2 and 5 fr. value in silver, and of 20, 50, and 100 fr. in gold. In Switzerland the franc was adopted as the unit, 1850. After the monetary convention between France, Belgium, Italy, and Switzerland, 1866, the standard franc of the law of 1795 ceased to be struck, the pieces of 50 and 20 centimes value being reduced to .835 of pure silver instead of .900. Austria has assimilated her system to that of France by making her 10-fl. piece equal to 25 fr. Roumania, Spain, Servia, Bulgaria, and Greece have adopted the equivalent of the franc, though they call it by other names. The standard franc is equivalent to 19.3 cents. .

France, republic of Europe, bounded N. by the Strait of Dover, the English Channel and Belgium; NE. by Belgium, Luxembourg, Germany, Switzerland, and Italy; S. by the Mediterranean; SW. by the Pyrenees, which separate it from Spain; W. by the Atlantic. Greatest length from N. to S., 600 m.; greatest breadth, 550 m.; area (Corsica included), 207,054 sq. m.; pop. (1906) 39,252,245; capital, Paris. Her colonies and dependencies in Asia, Africa, and America, and islands of the sea comprise an area of 4,397,826 sq. m.; pop. 56,117,740; colonies and dependencies in Asia are India, Annam, Cambodia, Cochin China, Tonking, Laos; in Africa, Algeria, Tunis, Sahara, Senegal, Senegambia and Niger, French Guinea, Ivory Coast, Dahomey, Kongo, Somali Coast and dependencies, Réunion, Comoro Isles, Mayotte, Madagascar, and islands; in America, Guiana, Guadeloupe and dependencies, Martinique, St. Pierre, and Miquelon; in Oceania, New Caledonia and dependencies, and establishments in Oceania.

The N. and W. coasts present a succession of sandy downs, cliffs of chalk and marl, chain reefs, and rocky cliffs. The Atlantic coast, about 350 m. long, is generally low and sandy. The coast of the Mediterranean, about 350 m. long, forms the Gulf of Lyons, bold and rocky near the Pyrenees, but lowering to the E. into a sandy beach, intersected by lagoons, with no good ports. Beyond the mouth of the Rhone the shore has bold cliffs and good ports. Several mountain chains intersect the country, the most important of which starts from the Pyrenees, and is called successively the Black Mountains, Cevennes, and Côte d'Or. The rivers of France are not of first magnitude, and but few are navigable for any great distance. The Loire is the largest, and waters the central part of the country. The E. slope, which is inclined toward the Mediterranean, is drained almost entirely by the Rhone and its branches. Canals, having an aggregate length of 3,000 m., give continuous communication from sea to sea, and through the interior of the country.

The climate is one of the finest in Europe, though greatly diversified. The average fall of rain in the valley of the Rhone is 30 in., while it does not exceed 20 in. on the Atlantic slope. Of the vegetable products, the most generally cultivated are wheat, rye, maize, buckwheat, oats, barley, and potatoes. Next to the U. S. France is the largest wheat-growing country in the world. Meadows and pastures are principally found in Normandy. In vine growing France occupies the first rank among the states of Europe. The rivers and coasts abound with fish, and the fisheries are important, especially that of pilchards off Brittany. Lead, zinc, cobalt, manganese, marble, porphyry, granite, alabaster, and slate are plentiful. Coal beds of various kinds are also numerous. Salt mines are worked in several of the departments. In extent of manufactures France ranks next to Great Britain. Silk culture is carried on in twenty-six departments, and her silk goods hold the most prominent place in point of quality. In jewelry and bronze goods France exceeds every other country. Paris is the great center of the fabrication of surgical and philosophical instruments, books, and articles of apparel and fashion. Leather is made and exported in larger quantities than from any other country of Europe. Shipbuilding is carried on at Cherbourg, Brest, Rochefort, Marseilles, Toulon, and Bordeaux. The exports consist chiefly of woven fabrics, wine, raw silk and yarn, linen, chemicals, sugar, skins and leather goods, tools, machines, and arms. The principal countries to which goods are exported are the United Kingdom, Belgium, Germany, Switzerland, and the U. S. The value of exports exceeds $952,000,000; of imports, $934,000,000, annually. The chief commercial ports are Marseilles, Havre, Bordeaux, Dunkirk, Cette, Rouen, Boulogne, Saint-Nazaire, and Calais.

Under the constitution of 1875, later modified, the legislative power is vested in the Chamber of Deputies and the Senate; the executive, in the President of the Republic and

his ministry. The President, elected by the Senate and the Chamber of Deputies, serves for seven years, and is reëligible. The ministries are those of Justice, Finance, War, Labor, Marine, Colonies, Public Instruction, Foreign Affairs, Commerce, Agriculture, and Public Works. Deputies are elected for four years by universal suffrage, one from each *arrondissement* unless the population exceeds 100,000, when two or more are elected. (*Arrondissement* corresponds roughly to "county" in the U. S.) The Senate is composed of 300 members, elected for nine years by an electoral body composed of delegates chosen by the Municipal Council of each commune, and of the senators, deputies, councilors general, and district councilors of the department. The united chambers elect seventy-five senators for life, but vacancies are filled by election of ordinary nine-year senators. The princes of deposed dynasties are precluded from sitting in either house. A special institution, known as the State Council, presided over by the Minister of Justice, or in his absence by a vice president, is composed of councilors, masters of requests, and auditors, all appointed by the president. It is judge in last resort in administrative affairs, and it prepares the rules for the public administration.

Up to January, 1906, the state recognized and maintained the Roman Catholic Church, the Reformed Church, the Augsburg Confession, the Jewish religious community, and in Algeria the Mussulman worship. The Concordat of 1801, with the pope, determined the relations between the state and the Roman Catholic Church. In December, 1905, the Church was separated from the state, the adherents of all creeds were given permission to form associations for public worship, and the state, the departments, and the communes were relieved from payment of ecclesiastical salaries. All buildings actually used for public worship were made over to the associations. There are seventeen Roman Catholic archbishoprics, corresponding nearly to the old provinces from the Roman period, and sixty-seven bishoprics. The school system is administered by the commune and the department under the general control of the Minister of Public Instruction and Fine Arts, and a national council.

Public instruction is free and compulsory; it is given in the communal schools, under the direction of lay teachers appointed by the prefects. Secondary, classical, or industrial instruction is given by the state in the lyceums, by the communes in the communal colleges, and by clergy or laymen in the seminaries. In order to educate professors the state has established for the classical branch the high normal school at Cluny. Higher instruction is given by the universities (*facultés*). The College of France and the Museum of Natural History, both in Paris, represent the independent studies; the Conservatory of Arts and Trades, in Paris, is a sort of industrial university. Outside Paris there are six schools of the arts and trades, several schools of the fine arts, agriculture, etc.

The military force of France consists of the active army, composed of all men, not legally exempted, and the reserves, composed of those who have passed through the active army. Every Frenchman between twenty and forty-five may be called upon to enter one or the other army. The number of men liable to military service is as follows: Active army and its reserve, 2,350,000; territorial army, 900,000; territorial reserve, 1,100,000; total, 4,350,000, of whom about 2,600,000 would be available. The navy is manned partly by conscription and partly by voluntary enlistment. There are about 415 effective war vessels, of which some twenty are modern battle ships and sixteen large armored cruisers.

The bulk of the French nation consists of the descendants of Gallo-Romans mixed with those of German and Scandinavian barbarians, who invaded Gaul between the fifth and tenth centuries. The French may be called a neo-Latin race; their language is Latin with a slight admixture of Germanic and Celtic. Ancient Gaul (Gallia Transalpina), inhabited by the Belgians, Celts, and Aquitanians, was conquered by Cæsar, 58–52 B.C., and reduced to a Roman province. Representatives of the Teutonic (Germanic) tribes gradually entered, and between the third and the end of the fifth century A.D., a general invasion of the rude tribes from the N. and E. took place, and in 486 Khlodwig or Clovis, a Frankish chief, founder of the Merovingian dynasty, wrested from the Romans the whole W. part of the country to the river Loire. By conquest, he added thereto and formed a kingdom, comprising nearly the same area as modern France. At his death, in 511, he left a consolidated Frankish Empire. The weakness of the kings led to the ascendency of their viceroys (major-domos), and one of the latter, Charles Martel, routed the invading Saracens at Tours, 732. Pepin the Short, son of Charles Martel, ascended the throne, 752, founding the Carlovingian dynasty, and the Gotho-Germanic Empire, established by the Merovingian kings, became French.

Carl, or Charles, the Great (Charlemagne), consolidated the empire, 768–814. At that period there were forty hereditary (*i.e.*, independent) vassals in the territory of France, including the Duke of Normandy, to whom Charles the Simple had given (912) the province W. of the lower Seine in order to stop the invasions of the Norsemen. The vassals, at the death of Louis V (987) passed by the proper heir, Charles of Lorraine, because he had given his allegiance to the German emperor, and chose for king, Hugh Capet. With the crowning of Hugh Capet (987), the Capetian dynasty was founded, which had sway till 1328. In 1303 Philip IV convoked for the first time that important assembly which came to be known as the *States-General*, made up of representatives of the three estates, the clergy, nobles, and free cities. On the accession of the house of Valois, 1328, in the person of Philip VI, nephew of Philip IV, the Hundred Years War with England began, the English king, Edward III, claiming the crown of France as a grandson of Philip IV. At last

Joan of Arc roused national feeling to an unconquerable pitch, and concentrated on the person of the king all the enthusiasm of the people, who, in 1429, brought the dauphin to Rheims, and had him crowned as Charles VII. Charles IX had the principal leaders of the Protestant party murdered at the massacre of St. Bartholomew, 1572; Henry III had the principal leaders of the Roman Catholic party murdered one after the other. Therefore, when Henry IV ascended the throne and founded the Bourbon dynasty (1589) he was obliged to devote the principal energies of the state to the difficult task of establishing harmony between the Roman Catholics and the Protestants. It was to this end that the *Edict of Nantes* (*q.v.*) was promulgated, 1598.

From abt. 1622 to 1642 Cardinal Richelieu (*q.v.*) controlled France, subduing the political power of the nobles, breaking the predominant power of Austria, and destroying the political power of the Protestants. During the first years of the reign of Louis XIV (1643–1715) France held the most prominent place in European politics and civilization. His second and last wars, 1689–97, 1700–13, were failures. Under Louis XV (1715–74) were waged the Seven Years War and other wars, which brought only disgrace and disaster. Under Louis XVI (1774–92) the country came to the verge of financial and political ruin, then occurred the French Revolution (*q.v.*), beginning in 1789. A republic was proclaimed, and the king was executed. A new constitution was adopted, 1795, and a Directory assumed executive power. This was overthrown by Napoleon Bonaparte, 1799, and a Consulate established. In 1804 Napoleon became emperor. Napoleon's reign was the most brilliant in French history, but disaster overtook his armies, he was compelled to abdicate in 1814, and at Waterloo, 1815, was overthrown. Louis XVIII and Charles X of the Bourbon dynasty ruled from then till 1830, when a revolution brought the Orleans family into power, Louis Philippe becoming ruler (the "Citizen King"). Another revolution in 1848 resulted in the establishment of the second republic. This was trampled down by Louis Napoleon in 1851, and a new monarchy set up under him as Napoleon III. Under the third republic, established 1870, France formed (1894) an *entente*, in effect a peaceful alliance with Russia, to offset the Triple Alliance (of Germany, Austria, Italy), the old rivalry with Germany persisting in diplomatic and commercial lines. Though at the height of commercial prosperity and progressing in all lines of culture, France has seen her birth rate falling off, and her prestige hurt temporarily by the Panama scandal (1892) and the reflections cast on certain departments of the government by disclosures in the course of the Dreyfus affair (1894–99 *seqq.*).

France, Anatole (JACQUES ANATOLE THIBAULT), 1844– ; French novelist and poet; b. Paris; elected to the French Academy, 1896. His works include "Corinthian Revels," "Jocaste and the Lean Cat," "The Crime of Sylvester Bonnard," "The Garden of Epicurus," "Our Children," "Balthazar," "Literary Life," "Alfred de Vigny."

Francesca (frän-chĕs'kä), **Pietro della**, 1398–1484; Italian painter; b. Borgo San Sepolcro; also called Pietro Borghese after his father; first painted several small pictures for the Duke of Urbino, which excited admiration; then went to Pesaro, Ancona, and Ferrara, where he decorated many rooms in the old palace, now destroyed. Nicholas V invited him, together with Bramante, to work in the Vatican, but his work was destroyed, as Raphael painted over the frescoes. Francesca returned to Borgo San Sepolcro, where he produced exquisite work, as also at Arezzo and at Loreto, with Domenico Veneziano. He was the first to lay down the principles of perspective and to imitate in painting different effects of light, to note intelligently the muscles in the nude figure, to prepare models in clay to paint the figures from, and to study drapery on them by putting it on wet.

Franchise (frăn'chĭz), in law, a privilege conferred by government on individuals or corporations which does not belong to the citizens generally by common right. In Great Britain the varieties of franchise are very numerous, and include such rights as these: to have wrecks, estrays, treasure-trove, or forfeitures; to hold fairs or markets; to establish and maintain ferries; to have a forest, chase, park, warren, or fishery, etc. In the U. S. the classes of special privileges are greatly reduced, and they are, almost without exception, vested in corporations. The most usual and important are the privileges of maintaining ferries, bridges, turnpikes, railways, telegraph and telephone lines, and a few legal privileges incident to being a corporation. The grantee must use his privileges only in the way and to the extent contemplated in the grant, and in the exercise of these is governed by the law of the land. In the case of grants bestowing privileges to be exercised in rendering some service to the public for a consideration, the obligations assumed by the grantee are to serve the public in the way and to the extent which he may reasonably be supposed to have agreed to do in accepting the franchise. For any violation or neglect of his duties he may be made to respond in damages, or even be deprived of the power with which he had been intrusted. There are three remedies available for the enforcement of the public duties of a corporation: *mandamus*, *quo warranto*, and indictment. A corporation may be compelled by *mandamus* to perform duties specifically and plainly imposed upon it. *Quo warranto* is a proper remedy in cases of usurpation or illegal uses of franchises.

FRANCHISE, in political law, a term used as an equivalent to the right to vote for candidates at a public election. The right of citizens of the U. S. to vote is now, to a certain extent, guarded by the U. S. Constitution, which provides that it shall not be denied or abridged by the U. S., or by any state, on account of race, color, or previous condition of servitude, and that Congress shall have power

to carry this provision into effect by appropriate legislation. See SUFFRAGE.

Francia (frän'chä), **Francesco**, 1450–1517; Italian painter; b. Bologna; family name, RAIBOLINI. Of artisan extraction, he was placed with a goldsmith, and learned that art; director of the Bolognese mint, and designed all its coins during the government of the Bentivogli and of Julius II. In 1490 he produced his first picture for the Misericordia, a Madonna in oil color. He soon became famous and popular, and received commissions from Lombardy and Tuscany, while his works in his own country are numerous. His Madonna pictures were especially famous. A pupil of his was his son GIACOMO, born at the end of the fifteenth century, whose works are sometimes taken for Francesco's.

Fran'cis, name of sovereigns of Europe, the most important of whom are given in the alphabetical order of the countries over which they ruled.

FRANCIS I, 1494–1547; King of France; b. Cognac; son of Charles, Count of Angoulême; succeeded his cousin and father-in-law, Louis XII, 1515; by the battle of Marignano, conquered Milan, which he claimed by inheritance; in 1519 began his contest with Charles V for the imperial crown and the control of Italy; in 1522, began a war against the emperor, the pope, and England; drove the Germans out of Provence, followed them into Italy, but was defeated and captured at Pavia, 1525, having previously lost all his Italian possessions; was imprisoned for a year and released under humiliating conditions. The war having been renewed in Italy, Rome was sacked by German forces, and the pope imprisoned; the French army sent to avenge him was destroyed before Naples by a loathsome disease. The Peace of Cambray, 1529, concluded the war, but hostilities were renewed in 1534, and again in 1542, without permanent advantage to France. The latter part of the king's reign was marked by persecutions of the Protestants. FRANCIS II, 1543–60; King of France; b. Fontainebleau; son and successor of Henry II. In 1558 he married Mary Queen of Scots, the niece of the Guises, who, as his queen (from 1559), swayed the policy of the court, and renewed the persecution of the Huguenots. The reign was taken up with court intrigues, the queen mother, Catherine de' Medici, and the Guises struggling for the mastery, which the former finally secured at the time of the king's fatal illness.

FRANCIS I, 1708–65; German emperor; succeeded his father, Leopold, as Duke of Lorraine, 1729, and, 1735, received Tuscany in exchange for Lorraine. In 1736 he married Archduchess Maria Theresa; in 1741, was made coregent with her, and in 1745 chosen emperor. Most of his attention was given to Tuscany, and Maria Theresa was the true sovereign in Germany. FRANCIS II of the Holy Roman Empire and I of Austria, 1768–1835; German emperor; son of Leopold II and grandson of Francis I; b. Florence; succeeded his father, 1792, in which year war was declared against him by France. Napoleon's brilliant operations in N. Italy followed, and the Treaty of Campo Formio, 1797, robbed him of Belgium, the Milanese country, and part of the Rhine provinces, In 1799–1800 he joined Russia and Great Britain in another war, but Moreau in Germany and Napoleon in Italy made this war end favorably in France, 1801. Francis took the title of Emperor of Austria, 1804, joined the coalition of 1805, and was compelled by the calamities of Ulm and Austerlitz to renounce his title of Emperor of Germany (1806), and his claim to Venice and the Tyrol. This was the end of the Holy Roman Empire. In 1810 his daughter, Maria Louisa, was given by him in marriage to Napoleon. He joined the allies, took part in the battle of Leipzig and the occupation of France in 1813, and was a leader in the Holy Alliance.

FRANCIS I, 1777–1830; King of the Two Sicilies; b. Naples; became Duke of Calabria, 1799; succeeded his father, Ferdinand I, 1825, having previously been associated with the Constitutionalist and Revolutionary Party, and attempted constitutional government in Sicily. His reign was one of cruel tyranny and corruption. FRANCIS II, 1836–94; King of the Two Sicilies (FRANCESCO D'ASSISI MARIA LEOPOLD); b. Naples; succeeded his father, Ferdinand II ("Bomba"), 1859, and adopted his father's reactionary policy. His realm was overrun by Garibaldi's forces, 1860, and when Gaeta, his last stronghold, was surrendered (1861), Francis escaped to Rome and later to France, where he lived in retirement.

Francis Fer'dinand, 1863– ; heir to the Austrian throne; b. Gratz; son of Archduke Charles Louis by his second wife, Princess Marie Annonciata, daughter of Ferdinand II, King of the Two Sicilies. By the suicide of the Crown Prince Rudolph, 1889, Charles Louis became heir to the throne, but renounced his rights of succession in favor of his son.

Francis Jo'seph, 1830– ; Emperor of Austria and King of Bohemia, Hungary, etc.; b. Vienna; son of Archduke Francis Charles and nephew of Ferdinand I, whom he succeeded, 1848. The Franco-Italian War of 1859 and the Prusso-Italian War of 1866 despoiled him of his Italian possessions, but the Treaty of Berlin, 1878, allowed him to annex Bosnia and Herzegovina. The emperor's only son, Crown Prince Rudolph, having committed suicide, 1889, the emperor's brother, Archduke Charles Louis, became heir, but he relinquished his right in favor of his son, Archduke Francis Ferdinand, who therefore is heir apparent.

Francis of Assisi (ăs-sē'zē), **Saint**, 1182–1226; b. Assisi, Italy; named GIOVANNI BERNARDONE, but called FRANCESCO by his father because of the child's proficiency in the use of the French language; served as a soldier against the troops of Perugia; through imprisonment and sickness he was led to renounce the world; in 1209, drew up a monastic rule for his few followers, which was approved, 1210; in the same year was made a deacon, the highest clerical position he would receive; in 1212, was joined by St. Clara and her sisters, the original Clarisses or Poor Clares of

the Order of St. Francis. He joined the crusaders at Damiatta, 1219; founded the Tertiary Order, 1221. On September 17, 1224, as is asserted, he had a vision of Christ, and received on his hands, feet, and sides the *stigmata*, or marks resembling the wounds of Christ. Among his numerous reputed miracles was the healing of the infant Bonaventura, afterwards a distinguished saint. St. Francis died in Assisi; canonized in 1228.

Francis of Pau'la, Saint, 1416–1507; founder of the Order of Minims; b. Paula, Calabria; was a Franciscan monk; in 1428 he retired to a grotto near his native place. There many followers came to him and built cells for themselves. In 1436 a church and convent were built, and the Order of Minims was established, under the name of Hermits of St. Francis. They practiced the sternest asceticism, having vowed perpetual abstinence from meat. Louis XI of France sent for Francis in hope of being cured. He was ordered by the pope to go, and was retained by Charles VIII, who consulted him in state affairs. Francis was canonized, 1519.

Francis of Sales, Saint, 1567–1622; b. at Château de Sales, Savoy, of a noble family; studied law at Padua, but entered the clerical profession. He became noted for his eloquence, and, on being raised to the priesthood (1593), gave himself to charitable and missionary labors. Accompanied by his cousin Louis, he undertook to convert the Protestants of Chablais, and, 1598, the Catholic religion was publicly restored there. In 1599 he was chosen Coadjutor Bishop of Geneva, and, 1602, bishop of that diocese. He established stricter rules for his clergy and for himself, renounced all luxuries, multiplied fasts, discouraged lawsuits, and reformed the monasteries. He was often invited to other cities, and he was much employed as a mediator. His book, "Introduction to the Consecrated Life" (1608), gave him still wider renown. In conjunction with Baroness de Chantal he founded the Order of the Visitation, 1610.

Francis, Sir Philip, 1740–1818; British politician; b. Dublin; son of Philip Francis (1700–73), an Anglican clergyman and translator of Demosthenes and Horace. Young Philip entered public life, 1756, under the patronage of Henry Fox, as a placeman in the state department, and held afterwards various places in the civil service at home and abroad until 1772. Was a member of the Council for Bengal, 1774–80, and the constant opponent of Hastings, by whom he was badly wounded in a duel; member of Parliament, 1784–1807. He is chiefly remembered as the supposed author of the "Junius" letters. See JUNIUS LETTERS.

Francis'cans, Mi'norites, Gray Fri'ars, or **Seraph'ic Breth'ren,** various names of one of the great mendicant orders of the Roman Catholic Church, founded in 1209 by St. Francis of Assisi. Mediæval Europe owes much to the Franciscans. They went everywhere, and, as preachers, they were like flames of fire. By and by they made themselves felt in every walk of life. Assisi became the capital of Christian art. Thomas de Celano, author of "Dies Iræ," and Jacopone da Todi, author of "Stabat Mater," were Franciscans; pontiffs like Nicholas IV, Alexander V, and Sixtus V were Franciscans; but, above all, some of the greatest and best of the schoolmen, as Roger Bacon, Duns Scotus, Bonaventura, Alexander of Hales, and Ockham, belonged to the order. Its numerical strength was greatest about fifty years after its foundation, when it had between 7,000 and 8,000 convents and nearly 200,000 monks. In the fifteenth century it declined, and was again greatly weakened near the close of the eighteenth century. At present the number of monks is nearly 100,000, and they are found in almost every part of the world.

Francis Xavier (zăv'i-ẽr), **Saint,** 1506–52; Jesuit missionary; b. Castle of Xavier, Navarre; taught philosophy in the College of Beauvais; received the Doctorate in Philosophy from the Sorbonne, 1530; 1534, joined the new society proposed by his fellow student and compatriot, Loyola. In 1537 they, with a few others, went to Rome and received the papal benediction on their new enterprise. He now toiled with zeal in the Italian prisons and hospitals, and, 1541, was sent by Loyola to Goa, India. During ten years in India, Ceylon, Japan, and Malacca he baptized, it is said, more than 1,000,000 persons, and planted the faith in fifty-two kingdoms. He died of fever, in the island of Hiang-Shan, near Macao, China, and was canonized in 1622. Many miracles are ascribed to him by Roman Catholic writers.

Francke (frăn'kẽ), **August Hermann,** 1663–1727; German Lutheran preacher and philanthropist; b. Lübeck; accused of pietism, he was obliged in 1691 to leave Leipzig, where he had established a school of scriptural interpretation, and passed to Halle, where he taught in the university and became pastor of a church. Here, too, he founded a charitable institution, which combines an orphan asylum, a pedagogium, a Latin school, a German school and a printing press issuing cheap copies of the Bible. The whole was sustained by private beneficence or by judicious labor connected with the orphan house.

Fran'co-Ger'man War, conflict between France and Germany in 1870–71. The success of Prussia in its war with Austria and the hegemony it thereby gained in Germany convinced Napoleon III that he could with difficulty maintain himself as Emperor of France, seeing that this position depended on maintaining his empire as the leading Continental power. French attempts to conclude an alliance with Prussia were frustrated by Bismarck; for the proposed treaty stipulated that Prussia should consent to the annexation of Belgium and Luxembourg to France, and France recognize the appropriations which Prussia had made and the intimate connection with S. Germany which she wished to accomplish. A request, followed by positive demands, that King William should order Prince Leopold of Hohenzollern to withdraw his acceptance of the Spanish crown, which had

been offered him (a success of Bismarck's policy), was met with a declination; nor would the king, to appease the French people, declare publicly that he approved of the renunciation the prince had voluntarily made. This last refusal, and distorted accounts of the various negotiations laid before the French Assembly, led that body to believe that France had been grossly affronted, and on July 19th war was declared. The Prussian chief of staff, Von Moltke, had already planned a campaign against France, and the success of that of 1870–71 was largely due to his genius as an organizer.

The French corps ready for battle in the beginning of August numbered hardly more than 250,000 men, and the corps stood too far apart when the fight began to give each other sufficient support. Three powerful German armies were formed, the S. German states having joined the N. German Confederation by the force of a natural instinct. The first army amounted to 447,000 men and 1,194 guns, its commander in chief being King William of Prussia. The first conflict—between the French outposts and the German vanguard—took place August 4th, at Weissenburg, on the left wing of the Crown Prince of Prussia, and the French were defeated. MacMahon, Marshal of France, at once chose a position at Wörth, with 50,000 men, and here the Crown Prince defeated him, August 6th, taking 9,000 prisoners and leaving 6,000 of the enemy wounded and dead. On the same day the French were defeated at Saarbrücken.

Every available man in France was now called into service, for the German armies were streaming over the frontier. Bazaine became commander in chief, instead of the emperor, and it was decided that the French army should retreat from the Moselle to Verdun. On the 14th the retreat began, but the forces were attacked by a brigade under Maj.-gen. Von Goltz, and the battle of Courcelles developed, in which the French lost about 4,000 and the Germans 5,000, but the latter were victorious. On the 16th the German cavalry fell on the bivouacs of the French cavalry, and the battle of Vionville, or Mars-la-Tour, the bloodiest of the war, ensued, in which the loss on each side comprised about 16,000 men, dead and wounded. Bazaine was now compelled to remain at Metz on the defensive; but on the 18th the battle of Gravelotte, or St.-Privat, took place, in which the French lost 609 officers and 11,605 men—the Germans, 904 officers and 19,658 men. The result was that the French army was shut up in Metz, and the investment of the city began.

An army of 140,000 men at Châlons, under Napoleon III, MacMahon, and Wimpffen, broke up and moved N., hoping to relieve Bazaine at Metz. This was attacked, September 1st, at Bazeilles, and further engaged near Sedan by an army of 250,000 under direct command of William I. The next day, the emperor and 84,333 men capitulated. The investment of Paris followed; on September 27th, Metz capitulated; Strassburg fell, October 27th; the French were defeated at various points, and every important strategical place was occupied by German troops. Paris, threatened with starvation, capitulated by the Treaty of Versailles, February 17th, by the terms of which Alsace and the largest part of Lorraine were ceded, and 5 milliard (*i.e.*, billion) fr. (nearly $1,000,000,000) were to be paid as war indemnity. On February 28th the German troops evacuated Paris, and on May 10th the definitive treaty of peace was concluded at Frankfort-on-the-Main. The last German soldier left French soil in July, 1873.

Franco'nia, formerly an independent territory situated along the Rhine, the Neckar, and the Main, from whose dukes the old German Empire more than once elected its rulers. It underwent many modifications until, at the dissolution of that empire (1806), it was divided between Bavaria, Saxony, Hesse, and Baden.

Franconia Moun'tains, W. cluster of the White Mountain group; in Grafton Co., N. H.; separated from the main group by the Notch. The Franconia Mountains are not as high as the others, but the presence of little lakes adds charm to the scenery. Mount Lafayette, or the Great Haystack, is 5,296 ft. Echo Lake, Eagle Cliff, the Profile Rock, Profile Lake, Bald Mountain, Walker's Falls, the Basin, the Flume, the Pool, and Georgiana Falls are attractive points. These mountains have deposits of iron ore.

Francs Tireurs (frăṅ tē-rėr'), "free marksmen," a name applied during the Franco-German War (1870) to members of the French guerrilla parties who carried on an annoying partisan warfare against the Germans.

Frangipani (frăn-jē-pā'nē), once illustrious family of Rome, having also allied lines of the same name in Naples and Croatia. The family is traced as far back as the seventh century, and claims to date from pagan Rome. During the eleventh, twelfth, and thirteenth centuries the name, already illustrious, became one of the most splendid in Italian annals, but it rapidly declined. The name signifies the "bread breakers," and recognizes the charities of its founders. Among its prominent members were CENCIO, a Ghibelline of the twelfth century; GIOVANNI, in the thirteenth century, a soldier and founder of the Neapolitan line; CORNELIO (d. 581), a great Friulian advocate, living at Venice; CLAUDIO CORNELIO, his son (1533–1630); NICCOLÒ, a Venetian painter of the sixteenth century; FRANZ CHRISTOPH, a Croatian conspirator (1630–71).

Frankalmoign (frănk-ăl-moin'), Old French, "free alms," in English law, the tenure, chiefly of lands, by spiritual service, as where a sole or aggregate corporation holds an estate of some private person, who gives it to God as free and perpetual alms. Tenures by frankalmoign were forbidden to be created after the eighteenth year of Edward I, but there are in England many examples dating from before that time. Frankalmoign implied no fealty or service, as did some other similar tenures.

Frankenthal (frănk'ĕn-tăl), town of Bavaria; in the Palatinate; 7 m. SW. of Worms. A canal puts it in communication with the

Rhine. It has a bell foundry, machine shops, sugar refineries, and trade in lumber, iron, and wine. Frankenthal appears in the eighth century as the village of Franconodal. It suffered in the Thirty Years' War, and in 1688 was captured by the French, who burned it 1689. Pop. (1900) 16,899.

Frank'fort, capital of Kentucky and of Franklin Co.; on the Kentucky River; 65 m. E. of Louisville; contains, besides the state capitol and county courthouse, the State Home for Feeble-minded Children, State Colored Normal School, state penitentiary, military institute, King's Daughters' Hospital, Odd Fellows' Hall, public library, and manufactures of lumber, carriages, furniture, cotton goods, whisky, flour, and pottery. On one of the numerous hills in the vicinity is a picturesque cemetery, where repose the remains of Daniel Boone, several governors, and many of the great men of the state. Pop. (1906) 10,447.

Frankfort, Coun'cil of, synod noted in church history for its condemnation of Adoptianism, the heresy which asserted that Christ was the Son of God as to his human nature only by *adoption*; and for its decided action against the worship of images. It was called by Charlemagne, 794 A.D., and, according to Dupin, was attended by 300 bishops, who came from Germany, Gaul, Spain, Italy, and England, besides two delegates from the pope.

Frankfort-on-the-Main, city of Prussia; province of Hesse-Nassau; on the right bank of the Main, and connected with the suburb Sachsenhausen, on the opposite bank, by bridges, the oldest of which, a stone bridge of fourteen arches, was built, 1340. The city proper is entered by seven large gates, two of which, the Gallus Thor and the Eschenheimer Thor, have been preserved in their old form; the other five are buildings of modern style. The walls and ditches which formerly stretched between these gates have been transformed into promenades, where villas and resorts of amusement alternate with almost rural surroundings. Among its public squares are the Rossmarkt, with the monument of Gutenberg, and the Götheplatz, with the statue of Goethe. Of its public buildings the most remarkable are the Römer, or townhall, an old building, in whose *Wahlzimmer* the electors met, and in whose *Kaisersaal* the elected emperor gave his first banquet; and the Cathedral of St. Bartholomew, a Gothic structure begun, 1238, and finished in the sixteenth century, in which the coronation of the German emperors took place.

On account of its geographical position, Frankfort early attracted attention. It was a favorite residence of Charlemagne. In 1257 it was made a free city. After the days of Frederick Barbarossa it became the place for the election of the German emperors, and by the "Golden Bull" (1356) Charles IV transformed this custom into a right. Napoleon made it the capital of a principality. In 1848 and 1849 the German Parliament sat here; but the city sided with Austria in the war of 1866, and so lost her autonomy.

The city is well provided with educational and charitable institutions, contains a fine zoölogical garden, and has manufactures of sewing machines, perfumery, chemicals, straw hats, etc., large banking houses, and important commercial interests. It is the richest city of its size in the world and the banking center of Germany. Pop. (1900) 288,989.

Frankfort-on-the-O'der, city of Prussia; province of Brandenburg; on the Oder; 50 m. E. by S. of Berlin; has extensive tanneries, machine shops, foundries, manufactures of organs, sugar, starch, tobacco, cigars, paper, wooden ware, and chemicals, an extensive trade. Its university, founded 1506 by the elector Joachim I, was moved to Breslau, 1811. The city was a flourishing member of the Hanseatic League; it has several times suffered severely in war. Pop. (1900) 61,852.

Frank'incense, any one of various fragrant gums and resins; anciently the substance now known as Olibanum, the product of two African and E. Indian species of *Boswellia*, small trees of the family *Burseraceæ*. The frankincense of Sierra Leone is from the *Daniella thurifera* (family *Leguminosæ*), a large tree growing on the mountains of that region. In the United Kingdom the frankincense of the shops is nothing but common turpentine, such as is exported from the S. U. S.

Frank'ing Priv'ilege, right of sending letters or packages free by mail. The post office having been originally established solely for governmental purposes, the carriage of official correspondence remained for a long time its only business. In England the right was claimed by the House of Commons, 1660, and privately allowed to members by the crown, which had hitherto enjoyed it in connection with the entire control and revenues of the post office. In 1839 the privilege was abolished in Great Britain by the passage of Rowland Hill's Act. In the U. S. the first appearance of the franking privilege after the assumption of the post office by the Continental Congress was in January, 1776, when it was granted to all private soldiers actually in service for letters written by and to themselves. Every few years since then Congress has modified the laws to meet the increase of public business or prevent improper use of the privilege. Ordinances conferred this on specified officers while in public service; others restricted or extended the privilege; public documents from every department of the government were subject to free carriage; newspapers were allowed free exchange with each other; the privilege was extended by special acts to ex-presidents and their widows during life; and then these general provisions were more or less modified, and some of them abolished.

By the Act of February 27, 1877, special stamps or stamped envelopes for official letters were required to be prepared by the postmaster-general and sold to the executive departments. The Act of March 3, 1877, abolished the use of official stamps, and provided official envelopes for the departments, with a penalty of $300 on their use for private matter, and

authorized all public documents to be transmitted free for Senators and Representatives, the secretary of the Senate and the clerk of the House. The use of the "penalty envelopes" was by Act of 1879 extended to all officers of the government except pension agents, and to the Smithsonian Institution.

Frank'land, State of, short-lived commonwealth in the U. S., organized, 1784, from the E. part of the present State of Tennessee. In that year N. Carolina ceded her W. lands to the U. S., and the people of the E. part of that territory, then under the laws of N. Carolina, angered at being thus disposed of without provision for their physical or legal protection, assembled at Jonesboro, and formed an independent state. N. Carolina then repealed the act of cession, and constituted the counties in E. Tennessee separate military and judicial districts. But these arrangements were not satisfactory, and a second convention was held, which declared the counties of Sullivan, Washington, and Greene independent of N. Carolina, organized a provisional government under the name of the State of Frankland, and made John Sevier governor. Political rivalries soon developed and led to a collision between two armed forces; the Sevier party was defeated; N. Carolina passed an act of oblivion with an offer of pardon for all offenders in Frankland; and the state and its troubles came to an end, 1788.

Frank'lin, Benjamin, 1706–90; American scientist and statesman; b. Boston, Mass. His father, Josiah Franklin, was a tallow chandler, of English birth; his mother, the daughter of Peter Folger, of Nantucket. Benjamin was the fifteenth of seventeen children. To keep him from going to sea, he was apprenticed to his brother James, a printer, and by much reading and careful and assiduous writing, he acquired such facility in writing that he ventured to print his thoughts on public affairs in his brother's newspaper, the *New England Courant*. His papers were well received, but the discovery of their authorship led to a quarrel between the brothers. During an imprisonment suffered by James, for political reasons, the newspaper was published in Benjamin's name. In 1723 the latter broke his indentures and ran away, first to New York and thence to Philadelphia, where he found employment as a journeyman printer. He married in 1730, established the *Pennsylvania Gazette*, and soon found himself a person of consideration not only in Philadelphia, but throughout the colonies, for his talents as a writer and his sound judgment. He established the Philadelphia Library, 1742, the American Philosophical Society, 1744, and was prominent in founding a college which in 1753 became the Univ. of Pennsylvania. In 1746–52 he carried on investigations into the nature of lightning, and still later resumed them; for his papers on the subject he received the Copley gold medal and was elected F. R. S. in 1775.

In 1753 he was made postmaster-general for the colonies, and several times served as commissioner to the mother country and to the various colonies. In 1754 he proposed a plan for uniting the thirteen colonies under a central government, under which each colony might preserve its local independence. He did his best to prevent the Revolutionary War by trying to avert the injustice which caused it, and procured the repeal of the Stamp Act in 1766. In 1775 he was chosen to the Congress, and, 1776, was one of the signers of the Declaration of Independence, having been also one of the committee to draft that instrument. During 1776–85 he was employed in the diplomatic service of the U. S., chiefly at Paris, where his influence was highly effective, and where his simplicity, dignity, and wisdom made him popular. During 1785–88 he was President of the Pennsylvania Supreme Council (in effect governor of the state), and in 1787 one of the delegates to the convention which drew up the U. S. Constitution. Of his writings, the *Busybody*, a series of papers somewhat after the manner of the *Spectator*, and the incomplete "Autobiography," are the best known, but his political, antislavery, financial, economic, and scientific papers are all noteworthy. He published the famous *Poor Richard's Almanac*, 1732–57, which was extensively reprinted in Great Britain.

Franklin, Sir John, 1786–1847; English admiral and explorer; b. Spilsby, Lincoln; went to sea in childhood; entered the navy; served at Copenhagen, Trafalgar, and New Orleans, 1815, being wounded in the gunboat fight on the latter occasion; led Arctic expeditions in 1818, 1819, and 1825; knighted, 1829; Governor of Tasmania, 1836–43. In 1845, in command of the *Erebus* and *Terror*, he went again to the polar regions, and never returned. Many expeditions were sent in search of the Franklin expedition, and from time to time relics of it were found; in 1859 Capt. F. L. McClintock found at Point Victory written record showing that Franklin died near Lancaster Sound, June 11, 1847, and there is no doubt that all his men also perished, though some long survived. Franklin's second wife, Lady Jane (born Griffin, d. 1875), was famed for philanthropy and her labor for the recovery of her lost husband.

Franklin, William Buel, 1823–1903; American military officer; b. York, Pa.; graduated at West Point, 1843; served in the Mexican War; and was afterwards assistant professor at West Point, professor in the New York Free Academy, and a consulting engineer; was colonel, May, 1861, and brigadier general of volunteers, August, 1861. In September he was in command of a division in the Army of the Potomac, and, May, 1862, became commander of an army corps. He covered the retreat from before Richmond, repulsed the enemy on the Chickahominy, June 27th and 28th, and commanded at the battle of White Oak Swamp Bridge; was made brevet brigadier general, U. S. army, June 30th, and major general, U. S. volunteers, July 4, 1862; was in the battles of South Mountain and Antietam, and commanded the left grand division of the army of the Potomac at Fredericksburg; commanded the expedition to Sabine

Pass, September, 1863, and was second in command in Banks's Red River expedition, April, 1864; was brevetted major general, U. S. army, 1865, and resigned, 1866; was president of commission for laying out Long Island City, 1871–72; U. S. Commissioner General for Paris Exposition of 1889; made Grand Officer French Legion of Honor, October 20, 1889.

Franklin, Bat'tle of, a battle of the U. S. Civil War between the Confederates under Gen. Hood and the Union forces under Gen. Schofield. After the fall of Atlanta (September 2, 1864), the Confederates determined upon an invasion of Tennessee, and on October 1st Hood crossed the Chattahoochee with 40,000 men to destroy Sherman's communications. Sherman, becoming aware of this intention, proceeded on his famous "march to the sea." The Union troops, under Schofield, fell back before Hood's advance, until, at Franklin, Tenn. (November 30th), Schofield was compelled to give battle. His army numbered about 27,000 men. Continued assaults were made by the Confederates, the battle lasting till a late hour, but each time they were repulsed with great loss. At midnight Schofield withdrew his troops and train to Nashville. The total Confederate force engaged was about 55,000 men; their losses in killed, wounded, and missing, about 7,000, including twelve general officers. The Union losses, in killed, wounded, and missing, were about 3,000.

Frank'linite, mineral found associated with red oxide of zinc, found both crystalline and noncrystalline (amorphous), chiefly at the Mine Hill and Stirling zinc mines in Sussex Co., N. J. It contains from 66 to 69 parts of peroxide of iron, with from 10 to 22 parts of oxide of zinc, and about the same proportion of oxide of manganese. Franklinite is worked for making zinc paint, and the residue, itself called franklinite, is used as a raw material for Spiegeleisen.

Frank Mar'riage, peculiar species of entailed estate formerly in use under the English law (and, subject to statutory modifications, still possible to exist), consisting in a gift of land by a father or kinsman to a daughter or cousin and her husband at the time of her marriage, on the implied condition that the land was to descend to the issue of the marriage. On birth of issue the condition was regarded as performed, and the estate became alienable.

Frank'owitz, Matthias Flach. See FLACIUS.

Frank Pledge, in Old English law, the pledge of one freeman for the good behavior of another; the system by which each freeman of an ancient English tithing (a subdivision of a county, consisting of ten freeholders with their families) was held responsible for the conduct of their fellow freeholders. On the commission of an offense by one, the others were obliged to have him forthcoming to answer the requisition of the law, or, in case of his escape, to bear the burden of any penalty that might be imposed.

Franks, Sir Augustus Wollaston, 1826–97; British archæologist; b. Geneva, Switzerland; considered one of the greatest authorities on the arts of the Renaissance and Oriental ceramics; long was keeper of the departments of British and mediæval antiquities in the British Museum; knighted, 1888; President of Society of Antiquarians from 1892 till his death; wrote "Recent Excavations and Discoveries on the Site of Ancient Carthage" and a "Guide to the Christy Collection of Prehistoric Antiquities and Ethnography," and edited "Horæ Ferales" and "Japanese Pottery."

Franks, confederacy of German tribes, which first appeared under this name near the lower Rhine about the middle of the third century, and finally wrested the NE. part of Gaul from the Romans in the fifth century. In the middle of the fourth century they gained possession of the islands of the Batavi and the country on the Scheldt. From that period they appear to have formed two separate groups, the Salian and Ripuarian Franks, the former nearer the shores of the North Sea. These established an empire under Clovis and his successors, a portion of which finally took from them the name of France; the Ripuarians spread S. on both sides of the Rhine, and gave the name of Franconia to the country adjacent to the Main.

Franz (fräntz), **Robert,** 1815–92; German composer; b. Halle; professor in the Conservatory of Halle; was blind. His songs number several hundred, and in merit are ranked next after Schubert's. Wrote also many accompaniments to the music of Handel and Bach.

Franz Jo'sef Land, Arctic archipelago lying mostly N. of the eightieth parallel and bisected by the meridian of 60° E. longitude; consists of islands whose number and size are still undetermined, though most are small, and probably none compares in size with the main islands of the Spitzbergen group, which they resemble in geological structure and in general aspect. The group was discovered by the Austro-Hungarian expedition commanded by Carl Weyprecht and Julius Payer, in the ship *Tegetthof*, on August 30, 1873. Payer's sledge journey in the spring of 1874 extended to Cape Fligely, 82° 5′ N. and 58° E., and resulted in a map of the archipelago. That map has been greatly changed by the explorations of Leigh Smith, 1880 and 1881, who extended the limits of the archipelago to the NW., and by the Jackson-Harmsworth expedition, which spent about three years among the islands from September 7, 1894.

Frascati (fräs-kä'tē), town of Italy, on the declivity of the Tusculan mount, 8 m. ESE. of Rome; favorite summer residence of the Roman nobility and cardinals for some centuries; many of their elegant villas remain, the most celebrated being the Villa Aldobrandini. On the summit of the mountain, 2 m. from Frascati, are the ruins of Tusculum, where many of the most eminent ancient Romans had villas.

Fraser, Charles, 1782–1860; American artist; b. Charleston, S. C.; admitted to the bar, 1807; retired from that practice in 1818, and took up art, giving his attention chiefly to miniature painting. Besides portraits he produced landscapes, interiors, historical pieces, and pictures of genre and still life. Published "Reminiscences of Charleston," and several poems.

Fraser, Simon. See LOVAT, LORD.

Fraser Riv'er, in British Columbia; next to the Columbia and the Yukon, the largest river in America falling into the Pacific; rises by two forks, one of which flows SE. from near 54° N. latitude and 125° W. longitude for 250 m., while the other flows from the Rocky Mountains (in latitude 53° 25′ N., longitude 118° 40′ W.), and reaches the junction (near Fort George) after a NW. course of 200 m. The course of the main stream is S. for 800 m. Large steamers descend it for 150 m. from its mouth to Hope. Large sea-going vessels mostly stop at New Westminster, 75 m. from the Gulf of Georgia. The Fraser River is chiefly important for the rich gold mines along its banks, and for its extensive salmon fisheries. The Thompson, an important tributary, joins the Fraser 172 m. from its mouth.

Frater'nal, or Friend'ly Soci'eties, associations which provide for their members' relief in sickness and in old age, and a small sum at death. The term originally included societies for good fellowship and conviviality, and many existing societies retain traces of these purposes. They have existed from very ancient time; the Chinese have had burial clubs, and one of the prominent features of the Roman trade guilds was the provision, at the cost of the whole body of members, of ceremonial observances at the death of one of them. During mediæval times the industrial guilds represented, on the Continent and in England, the idea of association for mutual benefit; but they died out and the modern friendly society is of new birth.

In 1793 the British Parliament passed an act for the encouragement of friendly societies, and since then the development of them has been promoted to such an extent that at the present time, British friendly societies include benevolent societies, cattle insurance societies, working men's clubs, and specially authorized societies for various purposes. The great friendly benefit societies may be divided into two classes those, like the Odd Fellows, Foresters, and Shepherds, whose branches are affiliated to the "order" or "unity," but separately registered, and those, like the Hearts of Oak, Rational Association, and Church Temperance Benefit Society, which are centralized under one board of management, and have one common fund. The affiliated societies have been extended to the British colonies and possessions and to America. Of both classes the Independent Order of Odd Fellows and the Ancient Order of Foresters are by far strongest in membership and financial support. The number of members of friendly societies reported by the chief registrar, 1905, was 13,978,790; their funds amounted to £50,459,500. The ordinary friendly societies reported 3,132,065 members, societies having branches, 2,606,029; collecting friendly societies, 7,448,549.

Friendly societies in France are of three classes: (1) Societies recognized as establishments of public utility; (2) approved societies ; (3) authorized societies. The first two classes have many privileges, such as exemption from certain taxes, etc. In Germany, legislation aiming at the universal extension of accident insurance, sickness insurance, and old-age insurance has brought the friendly societies into closer relation with the state than exists in Great Britain or elsewhere. See FRATERNITIES.

Frater'nities. See COLLEGE FRATERNITIES.

Fratricelli (frā-trē-chĕl'lē), zealots of the thirteenth, fourteenth, and fifteenth centuries, who, influenced by the Franciscans' ideas on poverty, adopted extravagantly ascetic habits, then later immoral practices and opposition to the papacy, going so far as to have community of wives and a pope of their own. They were condemned by Honorius IV, 1280, Nicholas IV, 1290, and Boniface VIII, 1296, and proceeded against by the Inquisition, which finally, in the fifteenth century, uprooted them.

Also a name for the "Spirituals," a party among the Franciscans, which in the fourteenth century struggled for reform. They accepted the prophetical works of Joachim of Flore as inspired. Most of them after a time quietly returned to the order of St. Francis.

Also term applied to the schismatics under Michael of Cesena, the general of the Franciscan order, who was joined by Lewis the Bavarian in opposing Pope John XXII, on account of his refusal to go their length in praise of poverty. Michael died unreconciled with the Church.

Fraud, any deception by which another person is injured; but it is necessary to explain how far such deception may go, and what must be its character, before the law recognizes it as a fraud and affords redress therefor; for not all deception is fraud in law. Some leading principles which run through the cases on this subject will indicate what acts the law will regard as frauds. (1) The fraud must be material to the contract or transaction, entering into its very essence. (2) The fraud must work a substantial injury; mere intention or expectation is not sufficient. (3) The defrauded party must not only actually have believed the false statement, but must have had a rational right to believe it. (4) A distinction, founded on practical reasons, is made between concealment and misrepresentation. Thus, if one buys goods on credit who is at the time insolvent, but says nothing about his affairs, the sale is valid; but if the buyer, being insolvent, falsely represents himself to the seller as having sufficient resources to justify the sale or credit, this is a fraud which permits

the seller to avoid the sale and reclaim the goods.

The courts of the U. S. have held that a buyer is not bound to inform a seller of particular circumstances material to the price offered, which are known to the buyer alone.

If one injures another by such fraud as the law recognizes, he is responsible therefor, although not interested in the transaction and not himself gaining by the fraud. The doctrine of constructive fraud is that by which the law treats as fraudulent certain acts which have, or are adapted to have, the effect of fraud, though none be intended; thus if one buys a chattel, and leaves it, however honestly, in the possession of the seller, this is a void sale as to a third party who buys of the seller without knowledge of the previous sale.

Frauds, Stat'ute of, peculiar law of the British Empire and of the U. S., which originated in the desire of English jurists to prevent the frauds perpetrated by suborned and perjured witnesses. It was thought this could be done by providing that a large number of the most common contracts should be incapable of legal enforcement unless in writing and signed by the party sought to be charged. Accordingly, in the twenty-ninth year of Charles II (1678), the "Statute for the Prevention of Frauds and Perjuries" was enacted, and its provisions have been adopted more or less entirely in most states of the U. S. By the fourth section of the English statute, which is the one that American statutes copy most frequently, no action can be brought on an agreement not reduced to writing and signed by the party to be charged therewith, or by some person by him authorized, if by the action: (1) any executor or administrator is to be charged to answer damages for the deceased out of his own estate; or if (2) any person is to answer for the debt, default, or miscarriage of another; (3) neither can suit be brought on any agreement in consideration of marriage; or (4) on any contract for the sale of lands, or any interest in or concerning them; or (5) on any agreement not to be performed within one year from the making thereof.

The second special clause, relating to a promise "to answer for the debt, default, or miscarriage of another," covers all guarantees. The third clause, relating to promises "in consideration of marriage," is held not to apply to a promise or contract to marry, but to promises of settlement or other provision in view of marriage. Another section (the seventeenth of the English statute) enacts that "no contract for the sale of any goods, wares, or merchandises, for the price of £10 or upward, shall be good, except the buyer shall accept part of the goods so sold and actually receive the same, or give something by way of earnest to bind the bargain, or in part payment," or that some note or memorandum be signed as before. This provision, in some form, is very common in the U. S.

In England the prevailing authority is that shares or stocks in incorporated companies are not "goods, wares, or merchandise" within the statute, and therefore the bargain need not be in writing. Perhaps the prevailing rule in the U. S. is the other way; but the authorities are conflicting, and the question may not be considered settled. As to giving something by way of earnest (the exact words of the English statute are "in earnest"), almost anything which has an actual value may suffice, and actual part payment has the same effect as earnest money.

Fraud'ulent Convey'ance, conveyance the object, tendency, or effect of which is to defraud another not a party to such conveyance, or the intent of which is to avoid some debt or duty due by or incumbent on the party making it. Such conveyances are declared invalid by two famous English statutes, which have been substantially reënacted throughout the U. S. By one of these, passed in the thirteenth year of the reign of Queen Elizabeth (1571), and commonly referred to as the statute 13 Elizabeth, chapter 5, all fraudulent conveyances, gifts, or alienations of lands or goods whereby creditors might be in any wise disturbed, hindered, delayed, or defrauded of their just rights, are utterly void. The second statute is known as the statute 27 Elizabeth, chapter 4, enacted 1585. It enacts that the conveyance of any interest in lands for the intent and purpose to defraud and deceive subsequent bona fide purchasers of the lands for a good consideration shall be utterly void. This act differs from the previous one in applying simply to lands, and in protecting the interests of purchasers instead of creditors.

Frauenburg (frow'ĕn-bŏrkh), town of Prussia; province of E. Prussia; on the Frische Haff; 42 m. SW. of Königsberg; is the seat of the Roman Catholic Bishop of Ermeland, and has a curious cathedral with six towers, which in former times served at once as a fortress and as a waterwork. The machinery intended for the latter purpose, and contained in one of the towers, is said to have been constructed by Copernicus, who was a native of Frauenburg.

Fraunhofer (frown'hō-fĕr), **Joseph von,** 1787–1826; German mathematician and optician; b. Straubing, Bavaria; while a glazier he studied optics, mathematics, and astronomy; became director of the Mathematical Institute of Munich, 1806; observed, measured, and described about 590 black lines crossing the solar spectrum, now called Fraunhofer's lines, 1815; admitted to Munich Academy of Sciences, 1817; Prof. and Director of the Cabinet of Physics at Munich, 1823; made improvements in fine glass making, in dioptric instruments, and in the machinery for making lenses. He also built the refracting telescope of the Dorpat Observatory.

Fraxinel'la, aromatic European herb of the family *Rutaceæ*, sometimes raised in gardens; so abounds in volatile oil that in warm, still weather the air around it becomes charged with inflammable vapor. This phenomenon is best shown by inclosing the plant in a box.

Frayssinous (frā-sĭ-nō'), **Denis Luc** (Comte de), 1765–1841; French preacher; b. Aveyron; was an ultramontane and legitimist priest, re-

nowned for his eloquent lectures, which, under the title of "Defense of Christianity," had many editions. Under the restoration he was successively Royal Preacher, Titular Bishop of Hermopolis, Grand Master of the Univ. of Paris, a peer, and Minister of Ecclesiastical Affairs, in which capacity he reinstated the Jesuits.

Fra'zier's, or Fray'zer's, Farm, Bat'tle of, also known as the battle of GLENDALE, NEWMARKET ROAD, NELSON'S FARM, and CHARLES CITY CROSSROADS, one of the seven days' battles before Richmond, fought June 30, 1862, between a part of Lee's army under Longstreet, Hill, Jackson, Magruder, and Huger, and a part of McClellan's army under W. F. Smith, Slocum, Sumner, Hooker, Franklin, Kearny, Richardson, Sykes, Porter, and McCall. Longstreet and Hill crossed the Chickahominy in pursuit of McClellan, and opened the battle by attacking McCall's division. The fighting became general and desperate, but the Confederates were foiled in all their plans, and the Union army advanced during the night, and was in position for the battle of Malvern Hill the next day.

Frechette (frā-shĕt'), **Louis Honoré,** 1839–1908; French-Canadian poet; b. Levis, P. Q. He was educated at Laval Univ.; was called to the bar in 1864, and practiced law until 1874, when he was returned to the House of Commons for Levis. He contributed to various newspapers, and in 1884 became editor of *La Patrie* in Montreal. He wrote both prose and poetry. Two volumes of poems, "Les Fleure Boreales" and "Les Oiseaux de Niege," were crowned by the French Academy, and he was awarded the first Montyon prize. He received honorary degrees from both McGill and Queens universities, and was appointed a Fellow of the Royal Society of Canada. His published works include "Mes Loisirs," "La Voix d'un Exilé," "Pele Mele," etc.; the dramas, "Veronica," "Felix Poutre," and "Papineau"; and in prose, "Letters à Bastile," "Critique des Rois de France," "La Noël au Canada," etc.

Frec'kles, discolorations of the skin taking the form of dark round spots, and found usually on the face or parts of the body exposed to the sun. The color of the skin is due to a deposit of fine pigment granules in its outer layer, the epidermis. When the darkening of the skin is diffused, and temporary in character, it is called *tan*. When the discoloration appears in the form of small round spots, and tends to be more permanent, it is called *freckles*. Freckles are most apt to affect those of fair complexion and reddish hair.

Frederi'cia, town and fortress of Denmark; in Jutland, at the entrance of the Little Belt. On July 6, 1849, it was the scene of a victory of the Danes over the troops of Schleswig-Holstein.

Fred'erick, name of several European sovereigns, the most important of whom are treated in the alphabetical order of the countries over which they ruled:

Under the reign of FREDERICK III of Denmark (1648–70) the constitution of the country was changed from an elective to a hereditary monarchy, in which the crown was invested with unlimited power. Under FREDERICK VII (1848–63) this constitution was changed, and the present one established (1849), according to which the executive power rests with the king and his responsible ministry; the legislative power, with the *Thing*, consisting of an upper and a lower house, elected indirectly and directly by the people; and the judicial power, with courts, in which the judges are appointed by the king, but for life. At the death of FREDERICK VII (1863), the Oldenburg dynasty became extinct, and was succeeded in Denmark by the house of Sonderburg-Glücksburg—Christian IX of that house being succeeded in 1906 by his son, FREDERICK VIII, b. in 1843.

FREDERICK I, 1121–90; German emperor; also known as FREDERICK BARBAROSSA (RED BEARD); son of Frederick, Duke of Suabia; succeeded his uncle, Conrad III, as King of Germany, 1152; crowned Emperor of the Holy German Empire at Rome, 1155. He brought order into the political affairs of Germany and into his Lombardian possessions, and fostered literature, arts, and sciences. Rebellions in Lombardy, fostered by the pope, took place, and when Frederick for the fifth time entered Italy he was terribly beaten at the battle of Legnano, 1176. Long conflicts between the Ghibellines (Frederick's party) and the Guelphs (Duke Henry of Saxony's party), ended in the partition of Henry's dukedoms, Bavaria and Saxony, among the emperor's friends, and the imperial rule became supreme in Germany. In 1189 Frederick organized the third crusade. After storming and taking the capital of the Sultan of Credi, he was drowned in crossing the Calycadnus, or, as some say, died of a fever. FREDERICK II, 1194–1250; German emperor; b. Jesi, March of Ancona; son of Henry VI; elected King of the Romans in 1196, and of Naples and Sicily, 1209; succeeded to the imperial crown, 1215; made two unsuccessful expeditions to the Holy Land, for which he was twice excommunicated; finally spent fifteen years in the Holy Land; took Jerusalem in 1229, and crowned himself king; but was thereafter twice excommunicated, and was involved in lifelong wars incited by the popes. FREDERICK III, 1415–93; German emperor; b. Innspruck; son of Ernst, Duke of Styria and Carinthia; elected emperor, 1440. His reign was one of almost continual wars; but he strengthened his own family, which still bears sway in Austria. The title Frederick III is sometimes given to the Duke of Austria, elected emperor 1314, who ruled jointly with Louis IV from 1325 to his death, 1330. By others he is reckoned as a king of Germany, but not as an emperor.

FREDERICK I, 1657–1713; first King of Prussia; b. Königsberg; succeeded his father, Frederick William the Great, as Elector of Prussia, with the title of Frederick III, 1688. On coming to power he declared null the will of his father, by which his half brothers received a part of his inheritance. By skillful diplomacy

strengthened his influence abroad and enlarged his boundaries at the expense of small neighboring states. In 1701, with the consent of the emperor, he took the title of king. FREDERICK II, 1712–86; third King of Prussia; surnamed THE GREAT; b. Berlin; son of Frederick William I; married Elizabeth Christina of Brunswick-Bovern; ascended the throne, 1740. He proclaimed freedom of religion, advanced the freedom of the press, established impartial justice, and granted the absolute right of petition to all. In 1740 the Emperor Charles VI died, leaving his inheritance to his daughter, Maria Theresa. Frederick, who laid claim to Silesia, invaded that country, 1741, and gained victories at Mollwitz and Chotusitz. As Maria Theresa was at war with France, she consented to the Peace of Breslau, June 11, 1742, which ceded to Prussia Upper and Lower Silesia as far as the Oppa River. Convinced that Austria would not allow this treaty to be permanent, he formed alliances with France and Bavaria, invaded Bohemia and took Prague, 1744. In 1745 he fought the brilliant battles of Hohenfriedberg, Sohr, Hennersdorf, and Kesseldorf. The Peace of Dresden, December 25, 1745, confirmed his possession of Silesia. During the next eleven years he kept at peace, and labored successfully to develop his realm.

To regain Silesia, Maria Theresa made an alliance with France, which Russia, Saxony, and Sweden joined, to check the growing power of Prussia. In the same year Frederick formed an alliance with England, and began the Seven Years' War, invading Saxony, defeating the Austrians at Lowositz, and compelling the Saxon army to surrender. In November he crushed the French at Rossbach; a month later, defeated the Austrians at Lenthen, and drove them from Silesia; in 1758 he overthrew the Russians at Zorndorf, and in 1760 gained important victories at Liegnitz and Torgaw. On August 12, 1759, he was disastrously defeated at Kunersdorf; in 1760 Berlin was captured by the Russians, and nothing but a combination of fortunate circumstances prevented the loss of his cause, chief of which was the death of the Czarina Elizabeth, on which Russia became an ally of Prussia. In 1763 France withdrew from her alliance with Austria, and Maria Theresa signed the Peace of Hubertsberg, by which the Prussian claims were confirmed. Joining Russia and Austria in the partition of Poland, 1772, Frederick added to his dominions. He displayed marked genius in peace as well as war—effaced the signs of disaster caused by the war, and long before his death made Prussia a modern nation. He was actively interested in literature, and his collected writings, published 1846–57, fill thirty volumes. FREDERICK III, 1831–88; second Emperor of Germany and eighth King of Prussia; b. near Potsdam; son of Emperor William I; learned the art of war under Moltke; married, 1858, the eldest daughter of Queen Victoria; entered the military service early in life. In the Austro-Prussian War of 1866 he commanded the Second army, numbering 125,000 men; during the Franco-German War led the Third army of about 200,000; won the victories of Weissenburg, Wörth, and Sedan, and bore a distinguished part in succeeding events; succeeded his father, March 9, 1888; died of a malignant affection of the throat.

Frederick III, surnamed THE PIOUS, elector of the Palatinate, 1559–76; educated at the court of Charles V, but married a Lutheran princess, 1537, and openly embraced Lutheranism, 1549. Under him the Palatinate became the principal home and chief support of Calvinism in Germany, the Lutheran Church being supplanted by the Reformed.

Frederick Charles Nich'olas (Prince), 1828–85; b. Berlin; nephew of Emperor William of Germany; entered the army in youth; served with distinction in Schleswig, 1864; had an important share in the victory of Sadowa, 1866. Commanded the Second Germany army in the Franco-German War; directed the siege against Metz; after the surrender, was made a field marshal, and dispersed the Army of the Loire in six weeks.

Frederick Will'iam, 1620–88; called THE GREAT ELECTOR; eleventh elector of Brandenburg; b. Berlin; succeeded his father, George William, 1640; made an advantageous peace with Sweden, 1648; reorganized the army; joined Sweden against the Poles, 1655, and freed Brandenburg from the Polish sovereignty; was recognized as Sovereign of Prussia, 1663; took a leading part, 1672–73, in the war with Louis XIV; routed the French at Fehrbellin, 1675, and by 1679 had expelled them from Prussia and Pomerania. The last years of his reign were devoted to the development of the material prosperity of his territories. Though not himself proclaimed king, he prepared the way for his successor, Frederick I.

Frederick William, name of four kings of Prussia, who follow: FREDERICK WILLIAM I, 1688–1740; b. Berlin; succeeded his father, Frederick I, 1713; forced the surrender of a large part of Swedish Pomerania to his sway; abolished feudal tenures. The ruling purpose of his life was the assurance of the future greatness of Prussia, through the economical rule of his own family. FREDERICK WILLIAM II, 1744–97; succeeded his uncle, Frederick the Great, 1786; lost the trans-Rhenish provinces to the French Republic, 1795, but his share in the second and third partitions of Poland, 1793–95, largely extended his sway. His extravagance and tyranny were partially offset by legal reforms and the encouragement of Prussian industries. FREDERICK WILLIAM III, 1770–1840; succeeded his father, Frederick William II, 1797; undertook at once the reform of the abuses of his father's reign, and by treaties increased his dominions. Was forced by his subjects to declare war against the French, 1806. The battles of Jena, Auerstadt, Eylau, and Friedland, followed by the Peace of Tilsit (1807), were most disastrous to Prussia, and reduced it to half its former extent. In 1813 the War of Liberation from the French was inaugurated; the battles of Lützen, Bautzen, Leipzig, and Brienne, and the occupation of Paris by the allies, followed,

and Prussia became more powerful than ever, chiefly at the expense of Saxony. **Frederick William IV**, 1795–1861; b. Sans Souci, near Potsdam; served in the wars against Napoleon, and was popular in early life; succeeded his father, Frederick William III, 1840, and adopted a reactionary policy. After the revolution of 1848, in place of the constitution proposed by the revolutionists, he promulgated one of his own, and dissolved the popular assembly; declined the imperial crown tendered him by the Frankfort Diet, 1849. Became insane, and yielded the crown to his brother (afterwards William I), who became regent, 1858.

Frederick, capital of Frederick Co., Md.; 60 m. W. by N. of Baltimore; is the seat of the State Institution for the Deaf and Dumb, Frederick College, and the Woman's College; has manufactures of tobacco, coaches, leather, knit goods, shirt waists, shoes, flour, castings, and canned goods. Frederick lies within 3 m. of the Monocacy battlefield, and 12 m. from the battlefield of S. Mountain. The Confederate army, under Gen. Lee, occupied Frederick for six days from September 6, 1862, and on the 12th of the same month the Union army, under McClellan, occupied the city. On July 9, 1864, it was again occupied by the Confederate army, under Gen. Jubal Early, who received as a ransom from her citizens $200,000. The remains of Francis S. Key, author of "The Star-spangled Banner," are buried in Mount Olivet Cemetery, adjoining the city, and those of Barbara Frietchie, immortalized by Whittier, lie in the old cemetery of the Reformed Church. Pop. (1900) 9,296.

Frederick Hen'ry Is'land, island claimed by Dutch; area about 400 sq. m.; is separated from the mainland of New Guinea, of which it forms a SW. part, by the narrow Strait of Dourga, or Marianne. Arafura Sea separates it from Australia on the S.

Fred'ericksburg, city in Spottsylvania Co., Va.; on the S. bank of the Rappahannock, 92 m. from its mouth; at the head of tidewater, 61 m. N. of Richmond. The city has very great water power supplied by a dam constructed across the Rappahannock just above the city. Fredericksburg has a public library, flour mills, a tannery, sumac mills, foundries, a shoe factory, woolen mill, silk mill, ice factory, cigar factories, a carriage factory, lumber mills, and two fine iron bridges across the Rappahannock. During the Civil War it was the scene of several bloody contests. Pop. (1900) 5,068.

Fredericksburg, Bat'tle of, next great battle of the Civil War in the U. S. after Antietam; fought December 13, 1862, by Confederate forces, 78,000 strong, under Gen. Lee, and Federal forces estimated at 116,000, under Gen. Burnside. The Confederates were intrenched on the heights back of the city, and there were attacked by divisions under Franklin, Sumner, and Hooker. After an all-day fight the Federal troops were defeated, and on the 15th recrossed the Rappahannock. The Federal loss in killed, wounded, and missing was 12,653; the Confederate, 5,377.

Fred'ericton, capital of New Brunswick and of York Co.; on the right bank of the St. John River, 84 m. from its mouth. The chief public buildings are the government house, the province building, Victoria Hospital, courthouse, city hall, barracks, the exhibition building, customhouse, jail, etc. Fredericton is the seat of an Anglican bishopric, of the Univ. of New Brunswick, and of the Provincial Normal School; contains also Christ Church Cathedral (Anglican) and several libraries. The chief business is commerce, particularly the lumber trade. The town was founded by Villebon, 1692, as a fort; under the name of St. Ann's Point was temporarily the capital of New Brunswick, 1701; the government was permanently established there, 1786. Pop. 7,800.

Frederikshald (frĕd'ĕr-ĭks-hăld), town of Norway; 50 m. SSE. of Christiania. To the SE. is a strong castle, Frederiksten, on a perpendicular rock, 350 ft. high. Here, December 11, 1718, at the siege of this fortress, Charles XII of Sweden was killed. The town has a fine harbor and considerable trade in iron and lumber. Pop. (1900) 11,936.

Frederikstad (frĕd'ĕr-ĭk-stăd), seaport of Norway; 50 m. SE. of Christiania, at the mouth of the Glommen; has a spacious harbor, with a good deal of Norwegian shipping; a good trade, manufactures of hardware, pottery, agricultural implements, brandy, etc., besides its lumber business. In olden times the town was strongly fortified, and, 1716, Charles XII of Sweden in vain attempted to capture it. Pop. (1900) abt. 15,000.

Fredro (frā'drō), **Alexander** (Count), 1793–1876; Polish dramatist, called "the Molière of Poland"; b. Suchorow, Galicia; the founder of Polish comedy; took his scenes from real life. Chief works, "Mr. Moneybags," "Ladies and Hussars," "Man and Wife," and "Revenge."

Free Bench, in English law, an estate in many respects resembling dower, which by the custom of most manors the widow has in the copyhold estates of which her husband was tenant. In some manors the husband's estate in the copyholds of which his wife was tenant is also called free bench, but this interest is usually termed his "courtesy."

Free Church of Scot'land, that branch of the Presbyterian Church which separated from the Established Church of Scotland, 1843, surrendering all state support in order to possess "spiritual independence," especially to get the right to veto a presentation to a parish when the majority of the people opposed it. Under the leadership of Thomas Chalmers, 474 ministers seceded. In 1852 the Synod of the United Original Seceders, and in 1876 the Reformed Presbyterian Church, united with this body; in 1900 the United Presbyterian Church united with the Free Church to form the United Free Church of Scotland, at which time the Free Church had 1,104 congregations, and 296,085

communicants. A number of ministers, elders, and communicants of the Free Church refused to enter the new union, and were extruded, or dispossessed, by the majority in the United Free Church from the use of the Free Church buildings and funds. The extruded parties went to law, and, 1904, they were declared to be the legal Free Church of Scotland, and entitled to all the invested funds, colleges, schools, churches, and manses, the value of this property being estimated at £5,000,000. This church has some 200 congregations and 100,000 communicants.

Free Cit'ies. See FREE IMPERIAL CITIES.

Free Congrega'tions, those formed in Germany, beginning 1841, as a rationalistic reaction against the revival of positive Christianity under King William IV of Prussia. They were originally known as "Friends of Light," or "Protestant Friends." The leaders of the movement at first professed to be Christians, but later affiliated with atheists and materialists, and were compelled by the government to separate from the church. Then they formed "Free Congregations." The leaders entered Parliament abt. 1848, and represented themselves as the leaders of the nation. When the reaction following the Revolution of 1848 set in, the government began to deal in a peremptory manner with these congregations. To-day there are in Germany only about sixty of them.

Freed'men, in ancient Rome, free men who had been slaves. Slaves liberated by certain forms, or owned with certain conditions before liberation, or over thirty years old at the time of acquiring freedom, became not only freedmen (*libertini*), but Roman citizens; others belonged to the class *Latini*; still others (*dedititii*) had no political status. The descendants of freedmen were free citizens, but even so they did not have the rights of the *gens* or tribe. See FREEMAN.

Freedmen, in U. S. history, a term denoting the colored people emancipated by the Civil War. Soon after its commencement, and especially after the Emancipation Proclamation, January 1, 1863, large numbers of slaves came within the Federal lines. The duty of caring for them devolved, first, on the War Department, and afterwards on the Treasury Department. They were supplied with food and clothing, and employed on fortification and other labor. Plantations abandoned by their owners were set apart for their use. They were enlisted in the Federal army to the number of 186,097. Various charitable and religious organizations did much for their education by organizing schools and employing teachers.

After the war the late slaves who flocked to the towns were transported to points where work could be obtained, and supervision was necessary to protect their rights, and to prepare them for a life of freedom. An act of Congress was passed, March 3, 1865, organizing in the War Department the "Bureau of Refugees, Freedmen, and Abandoned Lands," popularly known as the "Freedmen's Bureau," which remained in operation till January 1, 1869. The educational department continued till July 1, 1870. Several institutions for higher education were opened, some of which are still in operation. The number of rations issued to freedmen was over 15,000,000. The bureau was supported mainly by Congressional appropriations. Its expenditure for educational purposes to August 31, 1871, was $3,711,264, and the total expenditure for all purposes, $14,996,480.

Freedmen's Bu'reau, a bureau of the War Department of the U. S. Govt., established in 1865, for the supervision of lands abandoned during the Civil War and for the control of all subjects relating to refugees and freedmen from any part of the territory within the operations of the army. The bureau was under the control of a commissioner appointed by the President and confirmed by the Senate. The work thus assigned to this bureau was the organization into the methods of civil government of 2,500,000 people who had been driven from their former homes by the war. Gen. O. O. Howard, of the U. S. army, was appointed commissioner, and he at once installed a large number of assistant commissioners in various parts of the country. These were organized into the "quartermaster's division," the "land and claim division," the "medical division," the "transportation division," the "school division," the "bounty division," and the "financial division." The work of the bureau was intended to be only temporary. Gradually the schools, banks, and other institutions founded for the purpose of aiding in the passage over a rough period were turned over to the common system of government in the country.

Freehold, estate of inheritance or for life in real property. An estate of freehold may be either corporeal, as in land, or incorporeal, as in rents or franchises. Freeholds of inheritance are fees simple and fees tail. Freeholds not of inheritance are life estates, and may be either conventional (*i.e.*, created by contract between the parties), or legal (*i.e.*, created by operation of law). Conventional ones may be either (1) for one's own life, (2) for the life of another, or (3) for an indefinite period, which may or may not last during one's life. Legal life estates are (1) courtesy, (2) dower, and (3) jointure.

Free Impe'rial Cit'ies, term generally used for what in German history is called *Freie Reichs-Städte*—that is, towns which governed themselves by elected magistrates and formed independent communities subject only to the emperor. They were the natural result of the unsettled state in which society found itself in the early Middle Ages. As they acquired the power of defending themselves against the robberies of the knights they obtained political influence. They first appear fully developed in their distinct character as independent members of the empire in the reign of Henry VII, 1308–13. At the Diet of Augsburg, 1474, they for the first time divided themselves into two benches, the Rhenish and Suabian; and by the Peace of Westphalia, 1648, they were formally recognized as form-

ing the third *collegium* of the imperial diet. At the outbreak of the French Revolution they numbered fifty-one, the Suabian bench comprising thirty-seven. In 1803 their number was reduced to six, *viz.*, Hamburg, Lübeck, Bremen, Frankfort-on-the-Main, Augsburg, and Nuremberg. Augsburg and Nuremberg were incorporated with Bavaria, 1806, and Frankfort-on-the-Main with Prussia, 1866.

Free'man, Edward Augustus, 1823–92; English historian; b. Harborne, Stafford; examiner in law and modern history at Oxford, 1857–58, 1863–64; took a like position in the School of Modern History, 1873, and became Regius Prof. of Modern History and fellow of Oriel, 1884. Author of many works, including "History of the Norman Conquest," "Growth of the English Constitution," "The Ottoman Power in Europe," "Chief Periods of European History," "Methods of Historical Study," "The History of Sicily."

Freeman, man who is not a slave, or, in a narrower sense, a citizen or burgess who has certain specified rights. In ancient Rome freemen (*liberi*) were of two classes—*ingenui*, or free born, and *liberti* or *libertini*, freedmen, who had been slaves. The two classes had a distinct legal status, but the sons of freedmen were *ingenui*, though without tribal privileges. See FREEDMEN.

Free'masonry. See MASONRY.

Free Meth'odists, small sect found chiefly in W. New York, Illinois, and Michigan. They reported in 1908 in the U. S. 1,117 churches, 1,126 ministers, and 31,435 members. See METHODISM.

Free Ports, certain area in any one of a number of important ports of Europe, specially reserved, within the limits of which all goods may be landed or stored without paying duty. The whole area, with all markets and factories in it, is considered as "foreign territory." Thus at Hamburg, Bremen, and Copenhagen, the three chief free ports, commodities may be brought from any part of the world into the area set apart and then sent to foreign markets, paying duty only when taken into the country in which the free port is situated. The advantages of the free port to commerce are similar in many respects to those of bonded warehouses in the U. S.

Free Soil Par'ty, political party in the U. S., founded on the principle of nonextension of slavery to the territories. The immediate cause of its establishment was the acquisition of new territory through the Mexican War. It was organized at a convention (called by seceders on antislavery grounds from both the Whig and Democratic parties) in Buffalo, N. Y., August 9, 1848. It then nominated for President and Vice President Martin Van Buren and Charles Francis Adams, who in the election received a popular vote of about 291,000. The second National Convention of the Freesoil Party, at Pittsburg, Pa., August 11, 1852, nominated for President and Vice President John P. Hale and George W. Julian, who received a popular vote of about 156,000. The organization was merged in that of the Republican Party, 1856.

Free'thinkers, name applied to the deistic opponents of Christianity in England in the seventeenth and eighteenth centuries. Their leading representatives were Lord Herbert of Cherbury, Hobbes, Toland, Tindal, Woolston, Chubb, Anthony Collins, Bolingbroke, Shaftesbury, and David Hume. They were never an organized sect. In the eighteenth century the French writers, including Voltaire, D'Alembert, Diderot, and Helvétius, who labored for the overthrow of Christianity, and called themselves *esprits forts*, were in England called freethinkers.

Free'town, capital of the British colony of Sierra Leone, Africa; on the estuary of the Sierra Leone River; is the headquarters of the British forces in W. Africa; has schools in which Mohammedan youths are trained as teachers, and a botanical garden. Pop. (1901) 30,033.

Free Trade, trade of commercial intercourse free from artificial interference or restriction. In general use, the term has a more complex meaning, and expresses the doctrine of political economy which holds that the prosperity of a state or nation can best be promoted by freeing from governmental interference, so far as may be, the exchange of commodities and services between its own people and the people of other nations and countries, more especially from taxation of imports or of exports. "Free trade," as an economic principle or politico-commercial system, is the opposite of the principle or system of "protection," which maintains that a nation can most surely attain high material prosperity by "protecting" its industries from underselling by competitive foreign industries; the same to be effected either by prohibiting the importation of their products, or by laying such taxes on imports as shall, through a consequent enhancement of prices, impede their introduction.

It is essential to appreciate at the outset the relation which "free trade" and "protection," regarded as economic systems, sustain to the subject of taxation and revenue. The nature of this relation is as follows: The command of revenue being essential to the existence of government, the power to compel contributions, or "to tax," is inherent in every sovereignty, and rests finally on political necessity. This principle, strictly applied, means—no taxation but for maintaining the existence of the government and the operation of its several departments, *i.e.*, to defray its ordinary expenses in peace, and in war the same plus those due to the war. It seems, however, to be generally admitted that national taxation may properly aim at further ends; at least to the extent indicated when it is said that the state "may interfere with the laws of trade, repress one form of industry and stimulate another, discourage even to the extent of prohibition the indulgence of certain tastes and practices which it may judge detrimental to itself or its citizens, and expend the money raised by taxation in furtherance of

such objects"; and the great source of any funds needed for such purposes or for the more essential ends of government, is, in the practice of all governments, mercantile taxation.

Practically, then, there is no contention for absolute free trade; but the name "free traders" has been applied loosely to those who would have trade in all legitimate goods utterly free but for the fact that trade tariffs are the most convenient means of revenue. This school would adjust such tariffs with sole regard to the national treasury, scaling and placing the duties with a view to just about the total sum expected to be needed for governmental ends. That is the substance of "tariff for revenue only," which, moreover, implies that no purpose of taxation is to be met but by specific appropriation and through disbursement from the treasury.

This plan may be illustrated by taxes, high or low, on imported luxuries, or by low taxes on articles of universal use, but not produced in the country, or produced there in relatively slight quantities. This illustration points the principle of avoiding favor to selected domestic industries. The exclusive revenue aim tends also to "horizontal" tariffs, *i.e.*, to put all schedules on a common level, taxing as nearly as may be "according to the value," or by a uniform percentage of appraised values. The same tendency has been shown in a movement for tariff reform, by demanding a "horizontal reduction," *i.e.*, scaling down all schedules by a common rate.

The keen lookout against inequitable results in taxation is the ethical element opposed to protection, which is conceived to be a way of making the consumer pay a (bonus) tax to the home producer, the bonus being the addition to the home price caused by the customs tax on the imported goods. Thus protective duties are seen by the "free trader" as a sort of "class legislation," or social and sumptuary legislation in the interest of one class and discriminating against another and larger class. He does not find valid, nor always sincere, the protectionist's answer that the higher price maintains higher home wages and a higher domestic standard of living. On the other hand, it is through an actual or potential lift to the wages of those employed in the protected industries that the protectionist justifies this sort of tariff.

The fiscal objection to protective duties is that, so far as they do their intended work, *i.e.*, keep out foreign goods, they check the stream of revenue. Much is made of this point in argumentation. It is to be noted, however, that the high duties levied by the U. S. during the Civil War yielded a large revenue, which was a main object in laying them, and continued to do so a long time after the special circumstances of the war time had passed.

Mediating between tariff for revenue only and tariff equally and searchingly for protection stands the doctrine of tariff for revenue with incidental protection, *i.e.*, duties moderated so as to admit large importations, yet high enough and so adjusted as to stimulate domestic manufactures by increasing the price of competitive foreign products. This plan is much favored in the U. S., in order to strengthen the "American" or protective system against overturn or a too close approach to free trade. The plan is admittedly feasible, but so far as it fosters explicitly a domestic industry, it incurs the objections stated above. While even tariffs for revenue only cannot avoid some effect on home production, yet as they do not contemplate such an effect, any protection they afford must be not merely incidental, but accidental.

This whole subject is broadly complex, and various interests may be found looking both ways, as, *e.g.*, certain manufacturing interests in relation to free raw materials. See PROTECTION; TARIFF.

Free Will, or Free'dom of the Will, in theology, the question of free will is associated with the doctrines of Predestination and Original Sin. In the history of the doctrine the names of Augustine and Pelagius are specially representative. Pelagius taught a doctrine of ability of will which divorced the will from precedent character and, indeed, also from any effect on subsequent character. In opposition to him Augustine taught a doctrine of will, holding that the will is determined in its activities by the state of the soul, or the character. On these lines theological opinion has ever since been divided into Augustinian and Pelagian or Semi-Pelagian. Prior to the outbreak of this controversy the Greek Church had a leaning to a doctrine similar to what was afterwards known as Semi-Pelagianism; the Latin Fathers tended to the views which came into full expression in Augustine. The authorities in mediæval theology followed Augustine. Apparent differences are interpretational, not intentional. In the Reformation both the Lutheran and Calvinistic churches took strong ground against the entire Pelagian tendency. The theory of synergism, given vogue in the Lutheran churches through the influence of Melanchthon, was an attempt at harmonizing the two views. The Arminian doctrine of the will is Semi-Pelagian; and the same general conception has become very influential among the Congregationalists of the U. S., under the "improved" New England theology. Modern German theology is largely synergistic.

Free'will (or Free) Bap'tists, sect of Baptists who reject the tenet of predestination, declare the freedom of the will to refuse or accept Christ, and urge the possibility of salvation to all through a general atonement. This is the principal difference between them and the main body of Baptists, who adhere to Calvinistic views. Another point of difference relates to communion, the Free-will Baptists advocating open communion, while the others, at least in the U. S., are in the practice of restricted communion. As a result of the preaching of Whitefield, numbers of people separated from the Congregational churches of New England, and formed organizations designated as Separate churches or Separates. Numbers of these churches accepted Baptist tenets, and became known as Separate Baptist

churches. Abt. 1780 Benjamin Randall, a native of New Hampshire, began organizing the churches of Arminian sentiments into a new denomination. New Hampshire and Maine were the field of his early labors, but churches were soon formed in most of the New England states and Canada, and in several of the middle and W. states. Abt. 1830 a union was effected with the original Free-will Baptists of N. Carolina. Opposition to the union of the Separate Baptists with the Regular Baptists in 1787 led not a few into the Free Baptist body, thereby giving them representatives in nearly every S. state. In 1841 a union was effected with the Free Communion Baptists of New York and other N. states, who were sometimes designated as Free Baptists. They reported, 1908, 1,248 ministers, 1,409 churches, and 82,303 communicants. They are represented in thirty-three states, but are strongest in New England. They have more than 12,000 members in the S. states. Their schools are numerous and respectable. Bates College, Lewiston, Me., stands at the head of the list, a wealthy and progressive institution, with which is connected the Cobb Divinity School.

Freez'ing, change from a liquid to a solid state, resulting from the abstraction of heat. The zero of the centigrade thermometer, equivalent to 32° F., is the freezing point of water. It has been shown that the increase of pressure on all substances which expand in freezing, will lower the freezing point. Under a pressure of 13,000 atmospheres (195,000 lbs. to a square inch) water will not freeze at Fahrenheit's zero. On the other hand, such substances as paraffin, which contracts in freezing, have the freezing point raised by pressure. Artificial freezing can be best induced by the liquefaction of solids or the evaporation of liquids. Bodies so treated absorb heat, *i.e.*, these processes render it *latent* in the resulting liquid or vapor, and by abstracting it from the surrounding substances freeze the latter. In most cream freezers the liquefaction of a mixture of pounded ice and salt is the means employed. In artificial ice making the evaporation of ammonia or of the volatile ethers is the essential element. See ICE; REFRIGERATION.

Fregel'læ, ancient Volscian town, colonized by Rome, 328 B.C.; stood on the right bank of the Liris, probably nearly opposite Ceprano; was large, opulent, and faithful to the interests of Rome, but, 125 B.C., was destroyed by L. Opimius, in consequence of an insurrection.

Freiberg (frī'bĕrkh), town of Saxony; at the foot of the Erzgebirge; 20 m. SW. of Dresden, in one of the richest mining regions of Europe, no less than 1,500 mines of silver, copper, and lead being worked. Its mining school is celebrated. The town has silver-smelting works and manufactures of machinery, gold and silver ware, leather, and chemicals. There is a fine relic called the Golden Portal belonging to the ancient church, which stood on the site of the Gothic cathedral. Here, on October 29, 1762, Prince Henry of Prussia defeated the allied Austrian and Saxon army. Pop. (1900) 30,175.

Freiburg (frī'bŏrg), town of the grand duchy of Baden, Germany; on the W. slope of the Black Forest; 35 m. S. of Strassburg. Its cathedral, commenced, 1122, and finished, 1514, is one of the finest specimens of Gothic architecture in Germany. Freiburg is the seat of an archbishopric and has a university, and manufactures of sewing silk, beads, buttons, paper, etc. The town was founded in 1091, became a town, 1115, and after changing masters several times finally fell to Baden, 1806. Pop. (1900) 61,506.

Freight, (1) goods or cargoes transported from one place to another by carriers; (2) the price to be paid for such transportation. Only the second meaning of the term will be here considered. The nature of the obligation to pay freight, its amount, and the time of payment may be varied to a great extent by the stipulations in the contract of affreightment, evidenced by the charter party or the bill of lading. If no definite stipulations were made in regard to the freight, a contract for its payment would still be implied by law, and its amount would be determined by the usage of trade and the circumstances of the particular case. The general principle governing the contract of affreightment, and not often modified by particular agreement, are—that the shipowner after receiving a cargo on board has a right to retain it until the completion of the entire voyage of transportation; that his right to claim freight does not exist until the final destination is reached; and that he has then a lien upon the goods for the satisfaction of his proper charges. The amount of freight money payable is sometimes diminished by the arrival of the goods at their destination in a deteriorated condition or diminished in quantity. If the deterioration occurred by reason of natural causes, and could not have been prevented by reasonable care, as if the loss should be occasioned by natural waste, decay, or evaporation, or by unavoidable perils of the sea, the carrier is not answerable for the accident, and no diminution from the entire freight is allowed.

Freiligrath (frī'lĭkh-rät), **Ferdinand,** 1810–76; German poet; b. Detmold; in 1844 was prosecuted for his republican sentiments, and fled to London; returned and took part in the Revolution of 1848; was tried for the opinions expressed in his "Confession of Faith," and, though acquitted, was compelled to leave the country; returned to London, 1851; in 1868, removed to Stuttgart. His first volume of "Poems," 1838, reached its thirty-first edition in 1874; other works are "Ça Ira," 1846; "The Revolution," 1848; and translation of Victor Hugo's poems and of Longfellow's "Hiawatha." His later songs, such as "Hurrah, Germania," and "The Trumpet of Gravelotte," are highly popular.

Freire (frā'rĕ), **Ramon,** 1787–1851; Chilean military officer and politician; b. Santiago; joined the patriot army, 1811; later held independent commands; on the deposition of O'Higgins, was elected Supreme Director (virtually dictator), 1823; in 1826, drove the Spaniards

from Chiloé, thus ending their rule in Chile. Was reëlected Supreme Director, 1827, but resigned; headed an insurrection against the Conservatives in 1830; was defeated, captured, and lived in exile in Peru till 1842.

Fréjus (frā-zhüs'), **Col de,** depression in the crest of the Cottian Alps, about 16 m. SW. from the summit of the Mont Cenis Pass, and rising to 9,500 ft. Here a tunnel was excavated by Italy and France, 1857–71. For a long time this great work has been known as the Mont Cenis Tunnel, but its proper designation is the tunnel of the Col de Fréjus, or Mont Fréjus.

Frémiet (frā-myā'), **Emmanuel,** 1824– ; French sculptor; b. Paris; made his début in the Salon of 1843 with his "Gazelle"; in 1875 became Prof. of Drawing in the Museum of Natural History. Among the most celebrated of his works are "Wounded Dog Running," in the Museum of Luxembourg, 1849; "The Horse at Montfaucon," 1853; an equestrian statue of Napoleon I at Grenoble; an equestrian statue of Jeanne d'Arc at Paris; an equestrian statue of the Prince of Condé; a "She Bear Defending its Young from a Man of the Stone Age."

Frémont', Jessie (BENTON), 1824–1902; American author; b. Virginia; daughter of Thomas H. Benton; at fifteen married Lieut. John C. Frémont; lived in California, Washington City, and St. Louis. Published "Story of the Guard," "A Chronicle of the War," "Souvenirs of my Time," "A Year of American Travel," "Will and Way Stories," and a sketch of her father prefixed to her husband's memoirs.

Frémont, John Charles, 1813–90; American explorer, military officer, and politician; b. Savannah, Ga.; son of a French immigrant; employed as an engineer by the government in the Mississippi survey; became lieutenant of engineers, 1838, and between that date and 1845 led exploring expeditions to the Rocky Mountains and California. Led another expedition to California, and thwarted the attempt of the Mexican governor, De Castro, to destroy the American settlements on the Sacramento; defeated him in battle, and was elected Governor of the province by the settlers. Joined the U. S. naval forces at Monterey under Commodore Stockton, sent to conquer California; later was courtmartialed for quarreling with other officers, and declined reinstatement. He retrieved his honor by the survey of a great road from the Mississippi to San Francisco. Was one of the first U. S. Senators from California, 1849–51, and the first Republican candidate for President, 1856, opposing Buchanan, who defeated him. As major general of volunteers, he served in Missouri and in the Shenandoah Valley, 1861–64; resigned; was Governor of Arizona, 1878–82; made major general U. S. A.; retired, 1890. Wrote "Memoirs of my Life."

Frémy (frā-mē'), **Edmond,** 1814–94; French chemist; b. Versailles; became Prof. in the Museum of Natural History, 1843, and, succeeding Gay-Lussac, in the Polytechnic School, 1850. Made chemical discoveries, and published many works, including "Treatise on Chemistry" and "Chemical Encyclopedia," ten volumes.

French, Daniel Chester, 1850– ; American sculptor; b. Exeter, N. H. Works include "The Minute Man," at Concord, Mass.; "Peace and War," in the St. Louis customhouse; "John Harvard," at Cambridge, Mass.; "Dr. Gallaudet and His First Deaf-mute Pupil," "Memorial" to Milmore, the sculptor; "Statue of the Republic," at the Columbian Exposition, Chicago.

French Ber'ries, name given by dyers to the dried berries of various species of buckthorn from the Mediterranean countries, which produce a bright but not very permanent yellow dye. Also called Persian and Avignon berries.

French Broad Riv'er, rises in Henderson Co., N. C., near the Blue Ridge, flows NW. into Tennessee, receives the Nolichucky, and joins the Holston (now called Tennessee) 3 m. above Knoxville; is some 200 m. long; navigable 30 m., to Danbridge, by steamboats.

French Horn, metallic wind instrument, consisting of a tube usually coiled to make it more portable. It increases in diameter from the mouthpiece to the bell or flaring-open extremity. It is provided with longer or shorter mouthpieces, by which the key is varied, and the whole is provided with valves and keys.

French Lit'erature. French literature may be divided for the sake of convenience into six periods—the first, from the earliest beginning to the second third of the fourteenth century, or the accession of the house of Valois—a period chiefly devoted to the expression of feudal and knightly society; the second, to the end of the fifteenth century (the boundary commonly assigned to the Middle Ages), reflecting more particularly the life and ideas of the bourgeoisie; the third, including the sixteenth century, *i.e.*, the period of the Renaissance; the fourth, the period of French classicism, coinciding roughly with the seventeenth century; the fifth, sometimes called the Age of the Philosophers, comprising the eighteenth century down to the revolution; and the last, the period of realism, extending from the revolution.

It was the Germanic element of the French nationality that was the starting point of the most vigorous and flourishing part of its first poetic production—the heroic poems or *chansons de geste,* the germs of which lie in the memories of the exploits of the royal houses of the Franks, from the time of Clovis downward. The most famous of these was the "Chanson de Roland." Following the *chansons de geste* came the court poems, and Chrétien de Troies was the most popular and brilliant author of poems of this class. With the *fabliaux,* short tales in verse, the subjects changed to common life and the bourgeoisie. The *fabliaux* were in turn followed by the "Roman de Renard," stories of animals, having the same main interest and satirical intent as the *fabliaux.* Representative of these are the

stories of Renard, the fox; Isengrim, the wolf, etc.; but the work which represents the greatest achievement of the allegorizing spirit of the time is the "Roman de la Rose," begun by Guillaume de Lorris, abt. 1237, and finished by Jean de Meung abt. 1277. Francis Villon (1431–1500) was the greatest of the poets before the Renaissance; and belonging to this period also are Froissart's "Chronicles" and the "Memoirs" of Philippe de Comines. French literature of the sixteenth century, influenced by the revival of classical learning and religious reform, is characterized by vigor, variety, and freedom. Prominent writers of this period were François Rabelais and Montaigne. In this century, also, flourished the famous Pléiade. The seventeenth century opened with a predominance of a dramatic production, the most distinctive being the works of Hardy, Mairet, Rotrou, and Corneille in the early part of the century, followed in the later years by Racine and Molière. In this century, also, Boileau (1636–1711) holds a prominent place because of his critical influence, if not for his poetry. In fiction, Le Sage, who also wrote comedies, produced his immortal "Gil Blas," and La Fontaine (1621–95) produced his "Contes" and his collection of fables. Of seventeenth-century prose writers, Pascal (1628–62) is vigorous and satirical in his "Lettres Provinciales," profound, if somewhat mystical in his "Pensées." The memoirs of this period, the age of Louis XIV, are important, among them are those of the Cardinal de Retz, Madame de Motteville, and Madame de Sévigné.

Among the writers of the eighteenth century Voltaire holds first place, claiming notice as an epic, lyric, and comic poet; as an historian, novelist, tragic and comic dramatist, and as a philosopher. Next to him in immediate influence on the age stands Rousseau, made famous by his "Nouvelle Héloïse," "Confessions," and "Contrat Social." Writers of fiction of this period include Bernardin de St. Pierre, author of "Paul and Virginia," and Prévost, author of "Manon Lescaut," while dramatic literature was enriched by the "Barbier de Séville" and the "Mariage de Figaro" of Beaumarchais. The natural history of Buffon (1707–88) belongs to this period, as do the satires and historical work of Montesquieu (1689–1755). The age was not poetical, and poetry produced was chiefly imitations of foreign descriptive poets. Neither the revolution nor the first empire was favorable to literature, and the early nineteenth century has only Chateaubriand and Mme. de Staël as its most prominent representatives. Later in the century the influence of Goethe, Schiller, Shakespeare, Scott, and Byron began to be felt, and a new school, called the romantic, as opposed to the old classic, sprang up, headed by Victor Hugo. The most notable of his associates were Alfred de Vigny, Alfred de Musset, Theophile Gautier, and Sainte-Beuve. Drama of this period has a representative in Dumas, the elder, better known by his novels. Other writers of this time include Béranger, one of the greatest French song writers; Lamartine and Scribe. Among the novelists were Balzac, George Sand (Mme. Dudevant), Eugène Sue, the younger Dumas, who also wrote successful plays, Sardou, Feuillet, and Flaubert, in the earlier part of the period, and Zola, Cherbuliez, and Daudet in the later years. The post-romantic poets include Baudelaire, Leconte de Lisle, François Coppée, Sully Prudhomme, Catulle Mendes, and the Provençal poets, Frédéric Mistral, and Théodore Aubanel. In the works of history the last century has been prolific, the leading historians being Michaud, Sismondi, Guizot, Thierry, Thiers, Michelet, and Dury, together with the literary historians, Villemain, Vinet, Littré, Sainte-Beuve, and Taine. Writers on philosophy, science, and arts are legion in this century, and cannot here be mentioned.

French'man's Bay, an arm of the Atlantic extending 30 m. into Hancock Co., Me., with a general width of some 10 m. Mount Desert Island lies on the W. side of its entrance, and Schoodic Point on the E.

French Proph'ets, Protestant enthusiasts, who arose in France, mostly after the termination of the religious wars in the Cévennes. They were originally Huguenots. At the opening of the eighteenth century they amounted to many thousands of both sexes. They believed themselves under the immediate influence of the Holy Ghost, went into trances, saw visions, and were by the populace treated with awe and veneration. Abt. 1706 some of their prophets went into England and Scotland, and rapidly gained converts. They maintained that Dr. Eames, one of their number who had died, could be raised from the dead, and failing in this they speedily declined in influence and numbers. Their actions, however, left a stigma upon all Protestant refugees in Great Britain.

French Revolu'tion, the events in French history which, beginning with the meeting of the States-General in 1787, included the overthrow of the Bourbon dynasty and the abolition of the old feudal privileges, and ended with the establishment of the consulate in 1799.

The causes which led to the French Revolution were the poverty of the country, due to the extravagances of its kings, beginning with Louis XIV; the emigration of thousands of the most intelligent and industrious citizens through the removal of the guaranty of religious freedom by the revocation of the Edict of Nantes, 1685; of the consequent stoppage of industry and diminution of revenue, of unsuccessful and exhausting foreign wars begun only from royal vanity. As a continuing cause of discontent the government was in the hands of a privileged class, the nobility, who held over one half the soil of France and claimed all the exemptions of the old feudal system without rendering any feudal services, except, perhaps, personal attendance upon the monarch at the most extravagant court in the world. Popular dissatisfaction began to find voice in the theoretical works of such idealists as Rousseau, Voltaire, and the group known as the Encyclopedists.

The French court was the government of France. There was no constitution. The only authority was the king, who could interfere even with the courts of justice or imprison

individuals by his *lettres de cachet*. The Church, too, owned over one sixth of the soil, and paid no regular taxes. The state verged on bankruptcy. The king tried different ministers of finance—Necker, Colonne, and Brienne; then he recalled Necker, and convoked the States-General to meet at Versailles, May 25, 1789. In this assembly the votes were cast not by poll, but by class, and thus the Third Estate was subordinated to the privileged classes.

On June 17th the Third Estate constituted itself the National Assembly, and invited the nobility and the clergy to participate in its debates; on the 20th the Assembly pledged itself by oath (taken in the tennis court, or *jeu de paume*, their regular meeting place having been closed) not to separate until a constitution was made, and on the 23d it declared its members inviolable. To this the king answered by dismissing Necker and ordering troops to Versailles; but in the meanwhile the nobility and clergy had given way at the king's request, and joined the Third Estate. On July 12th, the first insurrection took place in Paris; on the 13th a national guard was organized by the business people, and revolutionary municipal boards were formed; on the 14th the Bastile was stormed, and on August 4th the National Assembly—or, as it was generally called, the Constituent Assembly—abolished all feudal rights and privileges. The royal princes fled; the emigration began. Church property was confiscated and monasteries suppressed, and assignats were issued upon the confiscated property. On October 5th the mob of Paris, followed by the national guard, rushed to Versailles, and, after massacring the royal guard, carried the king and queen back to Paris, whither also the Constituent Assembly removed. July 14, 1790, the constitution was ready, the king took his oath on it, and those of the nobility and clergy who refused to do so were thrown into prison. Still the excitement and disorder in Paris increased every day, and on the frontier the royal princes organized corps of émigrés, while Austria, Prussia, Saxony, Great Britain, and Spain formed an alliance, and offered the king their help against his subjects. Mirabeau, though hated by the queen and court, was looked to as the only capable leader, and his death, April 2, 1791, was a national calamity. The queen, Marie Antoinette, mistrusted by the people on account of her Austrian origin, had carried on a treasonable correspondence with her brother, Emperor Leopold II, and, June 21, 1791, Louis XVI and the queen tried to flee, but were stopped at Varennes, brought back to Paris and confined in the Tuileries. On September 14th the king had to take oath on a new constitution, and then the Constituent Assembly considered its work as done, dissolved, and gave place for the Legislative Assembly, after having unwisely prohibited any of its members from election to the new assembly, so that the latter was composed entirely of inexperienced men.

This assembly met October 1, 1791. Meanwhile Paris was excited by the protests of the foreign courts against the constitution, the royalist insurrections in Calvados and Vendée, and the movements of the emigrants on the frontier. War was declared against Austria and Prussia, and when reports came of the defeats of the French army—and when, moreover, the king, confident of help from the approaching Austrians, assumed a more decided attitude toward the Legislative Assembly—the excitement grew to wild fury. Armed bands broke into the Tuileries, June 20th, July 5th, and August 10th. On the last occasion the Swiss guard was massacred, and the king and the royal family had to seek refuge in the Legislative Assembly, from which they were brought to the Temple as prisoners. Robespierre, Marat, Danton, swayed the Parisian populace. On the news of the Prussian invasion of Champagne and the fall of Verdun a tribunal of national defense was formed, the constitution abolished, the Legislative Assembly dissolved, and a National Convention convoked. About 1,000 royalists and priests, who had refused to take oath to observe the new law, were killed in the massacre of September. But the news of the victory of the republican troops at Valmy abated the popular fury.

The National Convention, which met September 21, 1792, consisted of two parties—Jacobins, generally called the "Mountain," because they occupied the highest seats on the left of the hall, and comprising the most radical democrats—men without any definite ideas, but determined to carry the passion of the hour to its last consequences; and the Girondists, so called because they came from the Gironde, the representatives of law and order under the form of a constitutional monarchy, who were men of probity and talent. The convention declared France a republic. The Jacobins were in the majority, and their power was strengthened by the success of the war. The Prussians were driven back, Dumouriez conquered Belgium, Custine crossed the Rhine, and Montesquiou entered Savoy. The French armies felt that they were irresistible, and they pushed forward, trampling down everything that opposed them.

The king was brought to a trial December 11th, and executed January 21, 1793. The Girondist leaders were arrested June 2, 1793, and executed October 31st. A committee of public safety was formed, and invested with absolute power, which it exercised from July, 1793, to July, 1794, a period known as the "Reign of Terror." The convention passed a decree against all who were "suspected," and Barère declared that "terror" was the order of the day. In Bordeaux, Marseilles, and Lyons counter revolutions took place, but they were put down with a cruelty which had not been seen since the days of the Roman emperors. The government was an unlimited despotism, exercised not by one, but by many. He whom the Parisian mob lifted on their shoulders became the despot of the hour, and he could do with lives and property as he willed.

A reaction began to set in, but the Reign of Terror did not altogether cease, though the revolutionary frenzy had passed its culmination. In the excesses of Hébert and his party,

fect democracy with "liberty and equality," and he was willing to go through the terror of anarchy in order to break down the old social order and produce the new. But anarchy itself was not his ideal. Hébert and twenty of his party, the *Enragés* ("madmen") were arraigned as vicious men and traitors, and guillotined, March 24, 1794. A worship of the Supreme Being was substituted for that of Reason. But the reaction, once begun, could not be stayed. Hébert was followed by Danton (April 5th), and Danton by Robespierre himself (July 28th). The Jacobins were now without leaders, and, November 11th, their club was closed, and the party known as the "Jeunesse dorée" (gilded youth) even dared to attack all who had been prominent under the Terror. During the first half of 1795 the convention debated and adopted a new constitution, which placed the executive power in the hands of a Directory of five, and the insurrection against this new constitution, brought about by the intrigues of the radical democrats and the royalists, was successfully put down by the young Gen. Bonaparte. After some bread riots and other disorders the mob of Paris was disarmed, October 5th, and a reaction, known as the "White Terror," exterminated the defeated radicals. The total number of those guillotined during the Terror was about 2,600—less than the fatalities in many single battles of Napoleon's campaigns.

The situation of the Directory was by no means easy. From without it was attacked by Great Britain, Austria, and Russia, but it offered a vigorous and successful resistance to its enemies. By regular conscription it brought 200,000 men into the field. The war was everywhere carried on in the enemy's territory, and the armies of the young republic seemed to be unconquerable. Foreign countries were subdued, and French ideas were impressed on Europe. In dealing with its domestic foes, however, the Directory was less successful. La Vendée was still in an uproar, and when more peaceful and conciliatory measures were adopted, the royalists returned and began their intrigues. At the election of 1797 the royalists gained the majority in the representation, and the government had to use harsh—not to say terroristic—means to save itself. The Tuileries was surrounded with troops and cannons, and the royalist members were arrested. Their election was declared illegal, and they were banished. Also the financial difficulties proved too great for the government. In spite of the enormous sums which it drew from Belgium, Germany, and Italy, the Directory was unable to pay the public debt. It had to declare the state bankrupt, and repudiate two thirds of its obligations. Society and the public men of the Directoire period were generally corrupt. Under these circumstances there arose a general feeling of the necessity of concentrating the government in one single individual, and when, (November 9, 1799) Gen. Bonaparte overthrew the Directory by military force, and grasped

tario, Canada; flows into NE. corner of the Georgian Bay; length, 55 m. It will form the W. end of the proposed Georgian Bay Canal, connecting Lake Huron with the Ottawa River. The scenery in the neighborhood of the river is rugged and magnificent. Another FRENCH RIVER flows into James's Bay through the estuary of the Abbitibbe River.

French, or Trea'ty, Shore, that part of the W. coast of Newfoundland on which the French had the right of fishing and preparing fish under the Treaty of Utrecht, 1713: a right that not only discouraged settlement on that coast, but was a constant cause of trouble between various classes of fishermen and the local British and French governments till 1904, when, in an Anglo-French Convention, it was agreed that the French should abandon their establishments here on being indemnified by the British.

French Spolia'tion Claims, claims arising from the damages done to American ships and cargoes by French ships prior to the convention between the U. S. and France, ratified July 31, 1801. When the U. S. urged these claims, which it then estimated at $20,000,000, France retorted with a counter claim many times as great for damages resulting from the failure of the U. S. to keep its treaty obligations. The convention of 1801 was a mutual surrender of these claims, the U. S. thus becoming responsible to its citizens for their indemnification. After many attempts by the original claimants and their heirs to secure a settlement, Congress in 1885 authorized claimants to apply by petition to the Court of Claims, which was to determine the amount and validity of the claims, and report to Congress. The Fifty-first Congress appropriated more than $1,000,000 to pay claims then adjudicated; a similar bill for a like appropriation was vetoed by President Cleveland, 1896; and a third was approved by President McKinley, 1899.

French War, French and In'dian War, or **Old French War,** conflict between the English and the French in N. America, 1755–63; was a part of the Seven Years' War. In 1756 and 1757 Montcalm was successful, gaining possession of many important strategic points; but with the accession to power of the elder Pitt in England (July, 1757) the character of the war changed. Fort Duquesne fell to the English, who destroyed Fort Frontenac, on Lake Ontario, and possessed themselves of Fort Niagara, Crown Point, and Ticonderoga, driving the French into Canada. The conquest of Canada was next attempted. Gen. Wolfe led an expedition against Quebec, which resulted in the surrender of the city, 1759, and in 1759 the English were in full possession of Canada, which was formally ceded to England, 1763.

Freneau (frē-nō'), **Philip,** 1752–1832; American poet and editor; b. New York; was a shipmaster before 1780 and after 1797; captured

by the British, 1780, and confined in a prison ship. Aided the patriot cause in the Revolution by his prose and verse. Edited the New York *Daily Advertiser*, 1791; the Philadelphia *National Gazette*, 1791–93; the Mount Pleasant *Jersey Chronicle*, 1795; the New York *Time Piece*, 1797. Was translating clerk for Jefferson while in Philadelphia, and, like him, was a violent anti-federalist. Published "The British Prison Ship," "A Journey from Philadelphia to New York by Robert Slender, Stocking Weaver"; other volumes of verse, and collections of letters and miscellanies.

Frere (frēr), **Sir Henry Bartle Edward,** 1815–84; British diplomatist; b. Wales; nephew of John Hookham Frere; entered the Bengal Civil Service, 1833; became British resident in Sind, 1856; served during the Indian Mutiny; Governor of Bombay, 1862–67; became a member of the Privy Council, 1873. Was president of the Royal Geographical Society, 1873–74; negotiated the treaty of 1873 with Zanzibar, and was Governor of Cape Colony, 1877–80, during Kaffir and Zulu wars.

Frere, John Hookham, 1769–1846; English diplomatist and author; b. London; entered the Foreign Office; was in Parliament, 1796–1802; Under Secretary of State for Foreign Affairs, 1799; Envoy to Portugal, 1800; to Spain, 1802–4; made Privy Councilor, 1804; Minister to Spain, 1808–9; removed to Malta, 1821. Was a founder of the *Quarterly Review*; author of "King Arthur and His Round Table" (under the pseudonym of "Whistlecraft"); "Translations of Several Plays of Aristophanes," "Theognis Restitutus," and other writings.

Frère (frār), **Pierre Edouard,** 1819–86; French genre painter; b. Paris. His pictures are somewhat anecdotal in sentiment, but are well painted. He had many pupils and followers, and his works are popular on both sides of the Atlantic.

Fres'co, or Fresco Paint'ing, term vaguely applied to different methods of decorating walls in colors or in *chiaroscuro*, but which belongs only to paintings executed on fresh or moistened plaster. In the so-called *buon fresco*, or true fresco, mineral colors, mixed with water or lime water, are applied directly to the smooth wet face of lime mortar—the last very thin layer, called the *intonaco*, being of a particularly fine quality—in which case a new chemical combination takes place, and a crystalline surface almost impervious to moisture is formed. The practice of staining walls with colors in this way may be traced to Egypt and Greece, but it is doubtful whether it ever was applied to works of high art till near the end of the fourteenth century. The usual method of painting on plastered walls, in Giotto's time, was to allow the plaster to dry thoroughly, and then to rewet such portions of it as the artist could cover with color at a single sitting. This is called by later Italians *fresco secco*, or dry fresco.

After the beginning of the fifteenth century *buon fresco*, or painting on undried plaster, became the favorite art of the greatest Italian masters, and Masaccio, Mantegna, Demonias, Ghirlandajo, Francia, Perugino, Luini, Fra Bartolommeo, Raphael, Michelangelo, and Correggio all gloried in it and became glorious through it. The swiftness of execution required by the rapid drying of the mortar, the impossibility of correcting a mistake without removing a portion of the plaster, and the vast spaces to be filled, at once demanded and permitted the exercise of the highest artistic faculties. Michelangelo went so far as to declare oil painting to be work for only women and children. One obvious advantage of fresco over oil painting is that from the absence of all gloss the picture may be seen equally well from every point of view; another is its greater durability under the same exposure.

In Germany *fresco secco* has been revived in a novel form through the invention of a solution of silica (in form of fine sand) called water glass. Repeated applications of this solution are made to the well-dried surface of the best common mortar, after which it is again allowed to dry. The whole surface is then rubbed and polished; after this it is twice rewashed with the water glass, and once more left to dry completely. Mineral colors, prepared in water, are then applied for the decoration, and the artist can correct or change as freely as if working in oils and on canvas. When the whole is finished the surface is sprinkled with the water glass to secure the painting against atmospheric influences. This kind of fresco is called *stereochrome*, and may be seen in its highest perfection in Munich and Berlin.

Fresnel (frā-nĕl'), **Augustin Jean,** 1788–1827; French physicist and inventor; b. Broglie, Eure; government engineer for eight years in the Vendée; returned in 1815 to Paris. His researches on light at once placed him in the front rank of physicists. In 1819 he was appointed, with Arago and Mathieu, as one of the lighthouse commissioners of France; the same year he gained the prize of the Academy of Sciences for a memoir on the diffraction of light. On his deathbed he received the Rumford medal of the Royal Society, London. Fresnel's great life work was compressed into five years (1819–24). That work, for which commerce, and indeed the whole human race, owes him a debt of gratitude, was the perfecting of the dioptric system of illumination for lighthouses.

Freund (froint), **Hermann Ernst,** 1786–1840; Danish sculptor; b. near Bremen; apprenticed in youth as a blacksmith. Works include statues of "Eurydice," "Mercury," and "St. Luke," and the Ragnarok frieze for the Christiansborg Palace; lived in Copenhagen and Rome. His nephew, Georg Christian Freund, became a Danish sculptor of rank.

Frey (frī), or **Freyr** (frīr), in Scandinavian mythology, the brother of Freya and the son of Njörd. He is beloved of gods and men, and is himself the god of pleasure and fruitfulness. He is the husband of Gerda, the beautiful daughter of the giant Gymir, for whose love

he forfeited his good sword, which the gods sorely needed for their defense. He was especially worshiped in ancient Sweden.

Freya (frī'ă), or **Frey'ja** (the beloved), in Scandinavian mythology, the goddess corresponding to the Latin Venus; called also Vanadis, daughter of Njörd, the air god, and wife of the god Odur, for whom she perpetually weeps tears of gold. Half the heroes who die in battle belong to her, doubtless because of old the passion of love was so fruitful a cause of wars. Friday (*dies Veneris*) is Freya's day, or, as others say, Frigga's day.

Freycinet, Louis Claude de Saulces de, 1779–1842; French navigator; b. Montelimart; accompanied Baudin's expedition to Australia, 1800, and prepared the nautical and geographical portion of the report. In 1817–20 he commanded an expedition round the world, chiefly designed for the study of the figure of the globe, the elements of terrestrial magnetism, and weather conditions in the S. hemisphere. His narrative of this voyage is in thirteen volumes, 4to (1824–44).

Freytag (frī'täkh), **Gustav,** 1816–95; German author; b. Kreuzberg, Prussian Silesia; edited the Leipzig *Grenzboten,* 1848–70; held for some time a court position at Gotha; from 1879 lived at Wiesbaden. He produced successful plays, tales, and poems; was author of numerous novels, including "The Journalists," "Debit and Credit," "The Lost Manuscript," "Ancestors," and "Charlemagne."

Fri'ar, member of a monastic brotherhood, especially one who belongs to one of the mendicant orders—the Franciscans, Augustinians, Carmelites, and Dominicans. The Dominicans were called Black Friars, from their garments, and also Preaching Friars. The Franciscans were Gray Friars. The Carmelites at one time were called Barred Friars, from their striped robes, but in later times they were called White Friars. Monks not priests are called friars in Ireland, of whatever order; but after taking priests' orders they lose this distinctive name. The Franciscans are called *Friars Minor,* and there is a small order called *Friars Minims.* Crutched Friars were canons regular of the Holy Cross.

Friar Bird, local name given to an Australian bird on account of its bare head and neck; known also as the monk, leatherhead, poor soldier, and four o'clock.

Fric'tion, that force, always acting as a resistance which is experienced when it is attempted to move one body upon another which is pressed into close contact with it. Friction is generally supposed to be due to the interlocking of the asperities of the two surfaces, and to abrasion by tearing them off. Friction is of two kinds—sliding friction, which is encountered when one body is forced to slide upon another; and rolling friction, which is that resistance which is met with when it is attempted to cause one body to roll upon another. The friction of a sled upon the ground or of a sleigh upon snow illustrates the first kind. The resistance of a carriage or of a railroad train consists principally of the rolling friction of the wheels upon the road or upon the track, and of the sliding friction of the wheels with their axles. When two bodies are at rest and in contact, it requires more force to get up relative motion than to overcome friction after that motion has commenced. The "friction of rest" or "friction of quiescence" is greater than the "friction of motion." This difference is most marked with comparatively soft materials and with great pressures. A slight jar will usually reduce the friction of quiescence of hard, smooth surfaces to that of motion. It is this force which has most effect in reducing the efficiency of mechanical combinations, and the losses from this cause alone are frequently very serious, amounting to twenty-five or even fifty per cent.

The following law has been found to exist, but only within certain limits: Frictional resistance is proportional to the force with which the rubbing surfaces are pressed together, and is independent of the extent of those surfaces and of the velocity of rubbing. The law is departed from whenever the surfaces are subjected to such intensity of pressure as to become abraded or otherwise deformed. It is also inaccurate where the surfaces are separated by an unguent, and especially when they are of such great area that the resistance due to viscosity of the lubricant becomes considerable, as compared with the resistance of true friction. In this case the resistance varies approximately in proportion to the area of the surfaces in contact. This latter case occurs less frequently than the preceding. Great variations of velocity also cause a modification of the law, the friction becoming slightly less with high speeds.

The maximum pressure which the more frequently used unguents will bear varies with the speed of the rubbing surfaces, the liability to heat being measured by the product of pressure into velocity, *i.e.,* by the quantity of energy expended in a given time. At a uniform speed of 200 ft. per minute, the maximum per square inch, as determined by experiments on new iron shafts, running in loaded bearings, is as follows, when the elevation of temperature of bearing is not above 50° F.:

Winter sperm oil....65 lb.	Best mineral oil.....65 lb.
Summer sperm oil...75 lb.	Light mineral oil....55 lb.
Winter lard.....55 lb.	Lightest mineral oil .30 lb.

At lower speeds and with very hard and smooth surfaces much higher pressures may be allowed. Sperm oil, lard oil, and lard or tallow are the best lubricants for use on heavy machinery, either by themselves or dissolved in mineral oils. Lubricants having less "body" are more suitable for light machinery. All of the fixed animal, mineral, and vegetable oils are frequently employed, and plumbago and soapstone are sometimes used.

In general, to reduce the amount of power lost in friction, parts should be made as light as possible consistently with proper strength; rubbing surfaces should be given as great an area as possible; the velocity of rubbing and

distances moved over should be kept well below the maximum due the pressure; and lubricants should be carefully chosen, and should be supplied to the journals, if practicable, in streams, and collected and filtered for use over and over again. A free supply is the only secret of the remarkably low friction sometimes observed. A common length of journal for shafting, as made by the best builders, is five times the diameter. With ample surface and effective lubrication, wear becomes imperceptible. Heavy weights are often carried on rollers, and wagons and carriages are mounted on wheels, rolling friction being thus substituted for the more serious form of sliding friction. "Friction wheels" supporting the shafts of grindstones, or as applied in the "Atwood machine," also illustrate this case.

Although, in the operation of machinery and in many other instances, friction is an annoyance and the cause of even very serious losses, it is also frequently very useful. The friction of the driving wheels of the locomotive upon the track is essential to the useful application of its power. "Friction gearing," driving by the friction produced by contact and mutual pressures of smooth peripheries, has now many important applications. Nails, screws, and wedges would have no value except for the frictional resistance which retains them in place when once "driven home." The checking of the recoil of ordnance and of the motion of railroad trains is accomplished by "friction brakes." Even the act of walking becomes impossible when, as upon smooth ice, the foot finds no frictional resistance to its movements.

Fri'day, sixth day of the week, called by the Saxons *Frige daeg,* or day of Frigga (the wife of Odin), and by the Romans *dies Veneris,* or Venus's day. In the Eastern, Latin, and Anglican churches all Fridays, except when Christmas falls on a Friday, are days of abstinence, in memory of the crucifixion of Jesus, which occurred on a Friday, and is specially commemorated on Good Friday. In the folklore of many nations Friday is considered unlucky, doubtless on account of its religious associations.

Frid'eswide, Saint, patroness of Oxford; born there early in the eighth century; daughter of Dida, an ealdorman; preferred the religious life to marriage with Algar, a great Mercian noble, who, coming in search of her, was struck blind. She died in Oxford; was canonized, 1481. Catherine, Peter Martyr's wife, was buried beside her pillaged shrine, 1552; later exhumed by Cardinal Pole, but reinterred there, 1561, when the remains of the virgin saint and of the ex-nun were indissolubly mingled together.

Friedland (frēt'länt), town of Prussia; 27 m. E. of Königsberg. Here the allied Russians and Prussians under Bennigsen were defeated by the French under Napoleon, June 14, 1807. This reverse caused the retreat of the Russian general on Tilsit, where the treaty known as the Treaty of Tilsit was drawn up.

Friend'ly Is'lands. See TONGA ISLANDS.

Friends of God, body of religious persons in the fourteenth century. They were an unorganized brotherhood, some being laymen, like Nicholas of Basel, their greatest leader; others were monks, like Tauler, the great Dominican mystic. The Friends of God adhered to the Church, but attempted great reforms within it. They were mystics, but intent on realizing in practical life their ideas of holiness, and strict in attending church service. They gave novel and fantastic explanations of the religious symbols, and unsparingly denounced ecclesiastical abuses. They formed no sect, but attempts were now and then made at organizing local brotherhoods.

Friends, Soci'ety of, commonly called QUAKERS, sect of Christians, distinguished by their belief in the "Light Within," or the immanence of the Holy Spirit. The origin of this body is connected with the teaching of George Fox (1624–90), who sought to promote a revival of Christianity in its original simplicity and freedom. The central point of his doctrine is the direct responsibility of each soul to God, without mediation of priest or form, because of the presence of the Holy Spirit in the heart of every human being. The Quaker insisted on tolerance, and on the equality of all members of the state, refusing to doff his hat to men of rank, or to address them with the plural pronoun "you" when common folk were addressed with "thou" and "thee."

The Quaker avoided forms and written creeds, rejected music, and built a simple meetinghouse; he proclaimed a baptism of repentance and conviction, instead of baptism by water, and the communion of the spirit rather than the breaking of bread; and he created an ecclesiastical democracy, giving women equal rights with men, and allowing any member to lift up voice in the meetings for worship. The teaching of the Bible led Fox to put a literal interpretation upon the command of Christ, "Swear not at all"; and this refusal to take oaths led the Quakers into their chief difficulties with the state. Another command, "Thou shalt not kill," was regarded as forbidding military service.

The members of this sect called themselves at first the Friends of Truth, and later the Society of Friends. According to Fox, Justice Bennett at Derby in 1650 "was the first that called us Quakers, because I bade him tremble at the word of the Lord." They were cruelly persecuted, and by 1662 there were over 4,000 Friends in prison at one time. In 1666 Fox established the monthly meeting; in 1672 a yearly meeting was held in London; in 1675 articles of discipline were communicated to the quarterly meetings; in 1688 violent persecution ended.

The work of the society was carried into many parts of Europe, to Barbados, and N. America—even into Turkey. Its most important colonies were in N. America. In New England, at first, Quakers were persecuted. New Jersey received large numbers, and Pennsylvania owes its foundation to Quaker immigrants. Among prominent Quakers were John

Woolman, John G. Whittier, Elizabeth Fry, John Bright, William E. Forster, and William Tuke; in science, Dalton and Young.

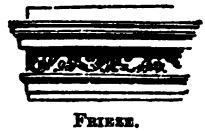
In 1827–28 the body in the U. S. divided. One party, the "Hicksites," protested against interference with the liberty of individual belief; the other party, known as "Orthodox," against those ministers, notably Elias Hicks, who threw doubt on the absolute divinity of Christ and the full meaning of the atonement. In this division, the Hicksites took a majority of Friends in the middle states. In 1837, J. J. Gurney, an English Friend, was engaged in religious work in New England; John Wilbur, a native preacher, who charged him with unsound doctrine (*i.e.*, with preaching not based on the New Testament), was disowned for his proceedings, and took with him a minority of the Yearly Meeting, now known as "Wilburites."

A number of educational institutions in the U. S. have been founded by Friends; these include the Westtown Boarding School, the Friends' School at Providence (founded in 1819), Haverford, Swarthmore, Bryn Mawr, Wilmington, Earlham, Penn, and Guilford colleges. In 1908 there were 1,075 churches, 1,466 ministers, and 122,081 communicants belonging to the four branches of the society.

Fries (frēs), **Jacob Friedrich,** 1773–1843; German philosopher; b. Barby near Magdeburg; lectured at Jena, 1801–5; Prof. of Philosophy and Mathematics at Heidelberg, 1805; returned to Jena as Prof. of Theoretical Philosophy, 1816, and, though for political reasons deprived of his chair during 1819–24, he remained there until his death. In philosophy he followed Kant, with whose principles he blended Jacobian conceptions, calling his system "philosophical anthropology," since he made all further knowledge dependent on man's self-knowledge. His works include "New or Anthropological Critique of Reason" and "System of Metaphysics."

Frieze (frēz), coarse woolen cloth having a shaggy nap on one side, and once much employed for making cloaks and jackets for laboring men. The Low Countries (Friesland) were a principal seat of the frieze manufacture, and hand-woven friezes of good quality are still made in Ireland.

Frieze, in architecture, generally a decorated horizontal band or belt; and in a more technical sense the band or member between the architrave and cornice of an entablature of the classic type, whether plain or ornamented. In ancient Greek architecture the frieze often was decorated with sculptured life forms, and called the *zoōphoros*; the Romans more often adorned it with conventional carved ornaments or grotesque and symbolic forms. The Doric order, as used by both these peoples, had a frieze of alternate metopes and triglyphs; the other orders had no distinguishing type of frieze. At Athens the metopes were frequently dec-



FRIEZE.

both hemispheres. A distinct plant of the Old World is sometimes called fringe tree, but it



Fringe Tree.

is more properly known as smoke tree or Venetian sumac, and it is also known as wig tree.

Fringil'lidæ, family of small singing birds, characterized by a conical beak; is one of the most extensive among birds, numbering over 500 species, and including those known as sparrows, finches, buntings, and grosbeaks. The distribution is somewhat peculiar, for the family is not found in the Australian region, although represented over the greater portion of the globe.

Frisians (frĭzh'ănz), Germanic people, inhabiting the NW. coasts of Germany, portions of the Netherlands, and some adjacent islands. Cæsar makes no mention of them; Pliny states that they dwelt beyond the Batavians. They were conquered by Drusus, but soon regained their liberty. The advance of the Franks pushed them to the very coast of the North Sea. Pepin of Héristal gained a decisive victory over them, 689. In the next century they became Christians. The SW. Frisians were the first to lose the characteristic features as well as the laws and the language of their race, and in the thirteenth century the name of Friesland belonged only to the district E. of the Zuyder Zee. The Frisians between the Lauwers and the Vly outlet of the Zuyder Zee offered a firm resistance to the counts of Holland, and were finally amalgamated with the empire of Charles V. Those between the Ems and the Jade became subject to the counts of Oldenburg, 1234. Those between the Jade and the Weser were subjugated by Oldenburg, 1514.

The small remnant of Frisians who still adhere to their ancient peculiarities and dialects are divided into three branches. The W. Frisians inhabit the E. coast land of the Netherlands; the E. Frisians live in the fens and morasses of Saterland and on the island of Wangeroog; the N. Frisians occupy the W. shore of Schleswig, and the adjacent islands of Sylt, Föhr, Amrum, and Helgoland. There is a wide difference among their dialects. The N. Frisian branch alone has ten distinct dialects. The Frisian dialects are closely related to Anglo-Saxon. In the literature of the old Frisian are some of the most ancient sources of Germanic jurisprudence.

Frit'illary, a lilylike plant spotted with purple, red, and yellow—its flower being often called "checkered lily"; many varieties are cultivated. One species, the crown imperial, is a fine showy flower of Persian origin.

Fritz, Samuel, 1653–1728; Jesuit missionary; b. Bohemia; being sent to Peru, he entered the Mainas missions of the upper Amazon, 1686, and, 1689, descended the river to Pará, where he was imprisoned by the Portuguese governor for two years; then returned to Lima, and, 1693, resumed his labors on the Amazon. The Omaguas missions were founded by him, and he established thirty-nine Christian villages. He explored the whole of the Amazon and many of its tributaries, and made the first good map of the river system, first published at Quito, 1707.

Fro'bisher, Sir Martin, abt. 1535–94; English explorer; b. Doncaster; in June, 1576, sailed with three barks in search of the NW. Passage, going as far as Labrador and Greenland, discovering the bay now known by his name, and returning in October. In 1577 he commanded a government expedition to the same regions, fitted out in consequence of indications of gold, and in 1578 another, with fifteen ships, which were scattered by storms. Was knighted for his services against the Armada, 1588; later commanded a fleet on the Spanish coast; and, 1594, supported Henry IV against the Leaguers and Spaniards.

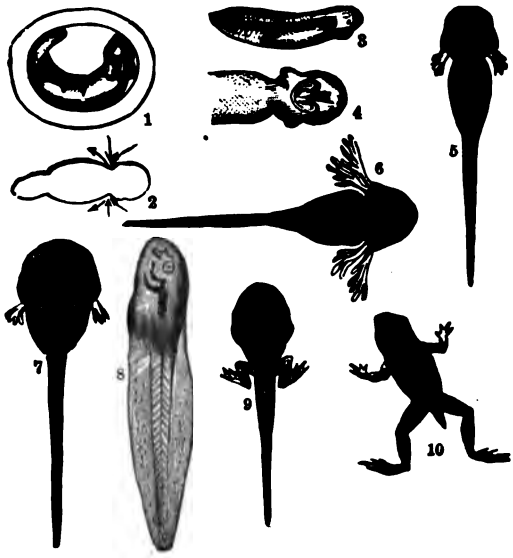
Frobisher Strait, arm of the sea, in British N. America, between Hudson Strait and Northumberland Inlet, extending from the Atlantic at the entrance of Davis Strait; is 240 m. long, and has a mean width of 30 m.

Froebel (frö'bĕl), **Friedrich,** 1782–1852; German educator; founder of the Kindergarten system; b. Oberweissbach, Thuringia; published the first volume of his work on education, 1826; afterwards edited a weekly journal; in 1837 he founded a model school for little children at Blankenburg, Thuringia, and later a normal school for female teachers at Marienthal, near Liebenstein, Saxe-Meiningen. The great freedom allowed the children led to charges of atheism and socialism against Froebel's system, and in 1851 all *Kindergärten* in which it prevailed were prohibited in Prussia.

Froebel, Julius, 1805–93; German publicist; b. Griesheim; nephew of the preceding; Prof. of Mineralogy and other sciences, Univ. of Zurich, 1833–44; edited the organ of the extreme radical party. Returning to Germany, he became a democratic leader; member of the Frankfort Parliament, 1848; was sentenced to death, with Robert Blum, but pardoned, and afterwards settled in the U. S., where he edited a German paper. From 1850 he traveled in Central America, and, 1855, edited a journal in San Francisco. Then he returned to Germany; went to Vienna in 1862, and reëntered politics as leader of the Gross-Deutsche, or

on politics, political economy, travels, etc.

Frog, batrachian reptile of the tailless order, embracing the families *Ranidæ*, or common frogs, and *Hyladæ*, or tree frogs. The *Ranidæ* pass most of their time in the water, being excellent swimmers; the length of their hind limbs enables them to make considerable leaps, and thus travel long distances in search of wa-



HATCHING PROCESS OF THE FROG.

ter; unlike the tree frogs, they cannot climb trees. Some species prefer moist localities and damp woods, where they hide in the grass and under leaves; others dwell in hollows which they dig on the borders of marshes, coming forth at evening or on rainy days. All the species when adult are carnivorous, and of great voracity. The tadpole, or larval stage of



GREEN FROG.

frogs, is distinguished by the large head, compressed tapering tail, and (in the youngest stage) want of legs. The name is also applied to the corresponding stage in other amphibians and even to the larvæ of many ascidians, having a superficial resemblance to the tadpoles of frogs.

The genus *Rana*, which includes the common frogs, is the best known and the most interesting, and comprises about forty species, found in almost all portions of the world except Australasia and S. America, the U. S. having nearly a dozen. The best-known are (1) the common bullfrog, (2) the shad frog, (3) the wood frog, (4) the marsh frog, and (5) the spring frog. Much the largest of these, and only rivaled in size by a species (*Rana tigrina*) of the E. Indies, is the bullfrog. Its color is green, bronzed with olive, and with dusky blotches. The shad frog is recognizable by its eyelike spots, which are dark brown bordered with yellow, and in allusion to which it is also called leopard frog; the name "shad frog" has been derived from its appearing in spring nearly at the same time as the shad. The wood frog is of reddish-brown color, and has a dark bridle-shaped stripe passing from the snout and through the eye backward; it is most abundant in woods. The marsh frog has four to six rows of squarish dark spots on the back and sides, and is also called the tiger or pickerel frog. The spring frog, or green frog, is of a bright green color, with a yellow throat and with a very large eardrum; it is one of the most common species, and one of the most esteemed as a delicacy for the table. See BATRACHIA.

Frog, device used on a railway track where one rail crosses another, so named from its resemblance to the "frog" in a horse's hoof. Frogs were formerly made of cast iron, but now steel rails suitably connected together are



KEYED FROG.

generally used. The "plate frog" has the rails riveted to an iron plate placed beneath them. The "bolted frog" is one in which the rails are connected by bolts passing through the webs, the spaces between being filled by cast-iron pieces. The "keyed frog," shown in the illustration, has the rails held together by clamps, which can be tightened by keys or wedges. A "spring frog" has the point held against the wing of the main track rail by a spring, thus preventing the jolt caused by the wheel in striking it. "Crossing frogs" are used where tracks cross each other, and if the angle is large, it is usual to have an inner rail running around the quadrilateral to serve as a guard rail and give extra stiffness.

Frog'fish. See ANGLER.

Frog Spawn, properly the name of the gelatinous mass inclosing the eggs of frogs; but the name is extended in rural districts to some of the large green fresh-water Algæ, which form slimy masses in streams and ditches.

Frog Spit'tle, Cuck'oo Spit, or **Toad Spit,** frothy substance often seen on grasses, weeds, and even trees, closely resembling human saliva in appearance, and consisting of the sap of the plant. It contains grubs, the larvæ of leaf hoppers—insects of numerous families of the *Hemiptera.* In the U. S. the genera *Heleochara* and *Aphrophora* are among the froth producers. These insects are great pests to vegetation.

Fröhlich (frö'lĭkh), **Abraham Emanuel,** 1796–1869; Swiss author; b. Brugg. His first work was a volume of "Fables," 1825, followed in 1827 by a small volume of "Swiss Lays." In 1835 he published "The Gospel of St. John in Songs." He also wrote three epics on the reformers Zwingli, Ulrich von Hutten, and Calvin; a volume of "Rhymed Proverbs," 1850; "Selected Psalms and Spiritual Songs," 1845.

Frohschammer (frō'shăm-ẽr), **Jakob,** 1821–93; German philosopher; b. Illkosen, Bavaria; was a Catholic priest when he began the series of writings which include "Christianity and Modern Science," 1868; "The Imagination as the Fundamental Factor in Cosmic Evolution," 1877; and "Outline System of Philosophy" (Part I, 1892).

Froissart (frwä-sär'), **Jehan** or **Jean,** 1337–abt. 1410; French chronicler; b. Valenciennes; was barely twenty years old when Robert of Namur induced him to write chronicles; became a priest; was made clerk of the chapel and secretary to Philippa of Hainaut, queen of Edward III of England, 1362; and attached successively to several princes and lords, he traveled widely in Europe. He showed no particular predilection for any country, nor any political bias, but graphically described pageants, festivals, and individual exploits, as he witnessed them. His chronicle is the living picture of his age. He completed it in the latter part of his life, while he was canon of Chimay. It extends from 1326 to 1400, and first appeared in Paris abt. 1498 under the title of "Chroniques de France, d'Angleterre, d'Écosse, d'Espagne, de Bretagne, de Gascogne, Flandres et Lieux d'Alentour." Henry VIII had it translated into English as "Chronicles of England" (two volumes, folio, 1523–25). A more exact and learned translation was made by Thomas Johnes (1803–5).

Fromentin (frō-măṅ-tăṅ'), **Eugène,** 1820–76; French painter and author; b. La Rochelle; won a first-class medal, Salon of 1859; became officer Legion of Honor, 1869. His pictures are remarkably fine in color, and his drawing of horses is excellent. He wrote charmingly and with critical knowledge on art subjects. His "The Masters of a Former Day" is an admirable book on painting, and his "A Summer in the Sahara" is a delightful book of travels. "Algerian Falconer," 1873, and "Arab Encampment" (his last work unfinished) are in the Louvre. Many of his best works are in the U. S.

Fronde (frōṅd), faction of French nobles who opposed Mazarin during the minority of Louis XIV. The breaking up of the feudal system by Richelieu led to a centralized despotism, against which the Parliament (high court) of Paris was the first to rise. It refused to register the royal edicts; and when the king forced it to register, the populace rose in its defense, August 27, 1648. In October following the popular demands were acceded to, but the malcontent nobles seized the opportunity of trying to overthrow Mazarin and to regain their old power, the princes of Condé and Conti, the dukes of Longueville, Beaufort, Orleans, Bouillon, Vendôme, Nemours, etc. The struggle lasted from 1649 till 1652, and in military results was favorable to the nobles, who thus gained opportunity for a great constitutional reform; but as they had no strong leadership, no fixed principles, and no definite object except self-aggrandizement, Mazarin, 1653, snatched from his mutually jealous and strangely frivolous enemies the fruits of their victory.

Frontenac (frōṅ-tẽ-năk'), **Louis de Buade** (Comte de), 1620–98; governor of the province of New France; b. in France; served in the army in Italy, Flanders, Germany, and received many wounds; became Governor-General of Canada, 1672. His first governorship (1672–82) was marked by the building of Fort Frontenac (now Kingston, Ontario) and the expeditions of La Salle, Marquette, and Joliet; but Frontenac, a man of great abilities, was hampered by the action of his intendant and of Laval, Bishop of Quebec, so long the virtual ruler of Canada. He was accordingly recalled, but, 1689, Canada being almost ruined under his successors, he was sent out again. He now punished the Iroquois, destroyed, through his lieutenants, the English fleet in Hudson Bay, ravaged Newfoundland, terrified all the English-speaking coast towns as far S. as New Jersey, captured Pemaquid, Casco, Salmon Falls, Schenectady, and in 1690 repulsed the forces of Phips before Quebec. He succeeded in restoring for a time the fallen fortunes of France in America.

Front'let. See PHYLACTERIES.

Frossard (frō-sär'), **Charles Auguste,** 1807–75; French soldier; served many years in Algeria; chief of engineers in the Crimea; a general in Italy, 1859; and governor of the prince imperial. As commander of the Second Corps of the Army of the Rhine, he opened the War of 1870 by attacking Saarbrück, August 2d; was defeated at the Spichern heights, August 6th; withdrew to Metz; fought at Courcelles, Mars-la-Tour, and Gravelotte; and was made a prisoner at Metz. He wrote a report on the operations of his corps in the war.

Frost, William Edward, 1810–77; English painter; b. Wandsworth, Surrey; in early career executed over 300 portraits; became Royal Academician in 1870. His "Prometheus Bound" gained the gold medal at the Royal Academy, 1839; "Una and the Wood Nymphs" was purchased by the queen, 1847. Other noted works, "Disarming of Cupid," "Bacchanalian Revel," "Diana Surprised by Actæon," and "The Graces."

Frost, frozen dew, the congelation usually taking place during the deposition, so that the water takes a crystalline form. The most remarkable formation of frosts are seen on the summit of Mt. Washington in autumn and winter, when crystals a foot or more in length attach themselves to exposed objects. When the soil is frozen in winter it is said to contain frost, and it is true that the frozen moisture then exists in a crystalline condition; but it is not strictly hoarfrost, such as is seen on exposed objects. When vegetation is killed by cold it turns brown or black, and the action is commonly called black frost. Frost generally makes the atmosphere more healthful.

Frost'bite, condition caused by the action of cold upon the animal economy. Frostbite is local and partial—freezing is general and more or less complete. Severe frostbite may lead to gangrene, but the milder forms often result in nothing worse than chilblains, which are very annoying, but not often dangerous.

Froude (frōd), **James Anthony,** 1818–94; English historian; son of Archdeacon Froude; b. Dartington; elected fellow of Exeter college, 1842; he sympathized with the High-church views then prevalent, and was ordained deacon (1845), but abandoned theology for literature. In 1847 published a volume of stories entitled "The Shadows of the Clouds," and, 1849, "The Nemesis of Faith." These were condemned by the university authorities, and soon he resigned his fellowship. In 1856 he published the first two volumes of his "History of England from the Fall of Wolsey to the Defeat of the Spanish Armada," which was completed, 1870, in twelve volumes. His contributions to periodicals were reprinted as "Short Studies on Great Subjects." He was made lord rector of the Univ. of St. Andrews, 1869; lectured in the U. S. on "The English in Ireland in the Eighteenth Century," 1872–73; was engaged for the government in an investigation in S. Africa respecting the Kaffir insurrection, 1874–75; and on the death of Prof. Edward A. Freeman (1892) succeeded him as Regius Prof. of History in Oxford Univ.

Fructidor (frük-tē-dōr'), in the French Republican calendar of 1792–1806, the twelfth and last month in the year, extending from August 18th to September 16th. In the year 5 (1796–97) occurred the "*coup d'état* of the 18th Fructidor" (September 4, 1797), in which Augereau, acting for the majority of the Directory, removed the minority from that body.

Fruits, in a wide sense, are the perfected ovaries of a flowering plant, with proper envelopes. Some fruits, like the strawberry, result from the blending of many ovaries with a fleshy receptacle. In others, as the fig, the fleshy receptacle is hollow, and the whole inflorescence, including many pericarps, is blended in the fruit. Strictly speaking, a fruit consists of the seed and its surrounding pericarp, and fruits receive various general names according to the nature of the pericarp; for instance, the achenium, the samara, the drupe, the pome, the berry, the sorosis, the pepo, and many other forms, of which the more important are noticed in this work under their alphabetical heads. See POMOLOGY.

Frumen'tius, Saint, Christian missionary of the fourth century; b. Phœnicia; captured by the Abyssinians while traveling in their country with his kinsman, a Tyrian philosopher, who was murdered by them. Frumentius was taken to the court, and became tutor to the young prince, on whose succession he returned home. Consecrated bishop by Athanasius at Alexandria, he again went to Abyssinia, where he became the founder and apostle of the Abyssinian Church.

Fry, Elizabeth (GURNEY), 1780–1845; English philanthropist; belonged to the Society of Friends; married Joseph Fry, 1800; in 1810 became a minister; and, 1813, began to devote herself to prison reform, laboring not only in the United Kingdom, but also on the Continent. Her "Memoirs, with Extracts from her Journals," was published by her daughters, 1847.

Fryken (frü'kĕn), series of lakes in Sweden extending in a N. and S. direction over about 15 m., and emptying into Lake Wener. Together they give the appearance of a broad river; the valley inclosing them presents fine scenery, and has been called the Swedish Switzerland.

Fryxell (früks'ĕl), **Anders,** 1795–1881; Swedish historian; b. Hesselskog; successively a professor, a clergyman, and (till 1847) provost of North Wermland. His chief work, "Narratives of Swedish History," appeared in forty volumes (1823–71).

Fuad Pasha (fō'ăd pä-shä'), 1814–69; Turkish statesman; b. Constantinople; physician to the admiralty, 1834; occupied various diplomatic posts, and held portfolios of the Interior and of Foreign Affairs. In 1861 he was made Grand Vizier—resigned 1863; was Minister of War from then till 1866, and again, 1867. Was regarded as the ablest Turkish statesman of his day. He published a Turkish grammar (1852), and "La Vérité sur la Question des Saints Lieux" ("The Truth about the Holy Land") in 1853.

Fuca (fō'kä), **Juan de,** d. 1602; Greek navigator whose real name was *Apostolos Valerianos*; b. Cephalonia; was many years in the Spanish service, and, 1592, discovered the channel known as the Strait of Juan de Fuca, which he believed to join the Atlantic and Pacific.

Fuchau (fō'chow), walled city and treaty port of China; capital of province of Fukien; on the Miu River, 30 m. above its mouth. Its walls have a circuit of 6½ m., are about 25 ft. high, and are pierced by seven gates surmounted by high watch towers. From the number of mock-banian trees found in the temple gardens and the inclosures, the city has received the name of Yung Ch'ing, or "Banian City." The E. part of the inclosure contains the Tartar town, where a Manchu garrison has

been kept since the Manchu conquest of Fukien in the latter half of the seventeenth century. The most important suburb is that which stretches from the S. gate to the river bank, where a stone bridge, the Bridge of Ten Thousand Ages, 1,350 ft. in length, connects it with Chungchau (Middle Island); from which another and similarly constructed bridge (less than 300 ft. in length) stretches to the island of Nantai. The river here swarms with junks and boats, large numbers of which are used by the natives as dwellings. Sea-going junks anchor below this bridge, while foreign ships discharge their cargoes into lighters 10 m. lower down off an island called Lo Sing by the Chinese and Pagoda Island by foreigners. Here on the left bank of the river is the Fuchau arsenal (founded 1867), the most important naval establishment in the empire. It includes a school of navigation and shops and shipbuilding yards from which many war vessels have been launched. Pop. (1904, est.) 636,000.

Fuchsia (fū'shĭ-ă), genus of dicotyledonous plants, belonging to the natural family *Onagraceæ*; has a popular name, lady's eardrop, from the hanging flowers. These are very showy, and of a red, violet, or rose color in their native state. They sport and cross easily, and hence result in numerous varieties. Those with white or cream-colored tints are the most prized. The tube of the calyx is showy, like



FUCHSIA COCCINEA.

the corolla, and is extended much beyond the ovary. It is bell shaped or tubular, with four spreading lobes. The petals are also four in number, and the stamens eight. The plants are mostly smooth, with opposite or whorled leaves. They are natives of S. America as far as Terra del Fuego, and also of the S. parts of N. America; and New Zealand has some native species. Their best-known habitat is the Andes of Chile and Peru. The species in cultivation have been so changed by art that it is often difficult to trace the line of their descent.

Fucino (fō-chē'nō), or **Celano** (chā-lā'nō), **Lake of,** historic body of water in central Italy, near the towns of Avezzano and Celano; about 50 m. E. of Rome; at 2,200 ft. above the sea, in a mountain basin of the Apennines having no known natural outlet. The ancient and mediæval accounts of the dimensions of Lake Fucino and of its changes of level are conflicting; 1810, it covered 42,000 acres, with a maximum depth of 75½ ft.; 1835, its area was 33,000 acres, and greatest depth, 34 ft. Julius Cæsar planned the drainage of the lake by means of a tunnel; the Emperor Claudius spent eleven years in building one 18,506 ft. long, which soon fell into decay. Prince Torlonia of Rome built (in 1852–62) a new and larger one than the Claudian, at a cost of over $6,000,000, and by 1875 the entire lake was drained.

Fu'coids, the *Fucoideæ*, an order of brown seaweeds commonly represented on the coast of the U. S. by the rockweeds. They are plants of considerable size, ranging from a few inches to several feet in extent, and often show a differentiation into stems and leaves. Their outer tissues are composed of small and closely crowded cells, while the interior cells are loosely arranged, leaving large intercellular spaces.

There are about twenty genera, all of which are included in the single family *Fucaceæ*. The common rockweeds of the coast are species of Fucus and Ascophyllum. The fucoids are all of a brownish or smoky green color, resembling the kelps, which have often been included with them under the same name. The most common genus, the *fucus*, is recognized by the inflated air vessels in the substance of the stem or branches; there are but two species on the Atlantic coast of the U. S., two on the Pacific coast, and two on the coasts of Greenland and Newfoundland. They are found on rocky shores growing between high and low water marks. Our Atlantic species, *Fucus vesiculosus* and *F. nodosus*, are popularly called rockweed and bladder weed, and form a large share of the vegetation of the tidal rocks from New Jersey northward, where they are conspicuous at low tide and give the rocks a somber appearance. Their chief value is as a fertilizer.

Fu'el, any substance which may be used for the generation of heat by its combustion in air. Heat is evolved in many processes, as the slaking of lime with water, but, properly speaking, only carbon and hydrogen and their compounds are fuels. Fuels such as wood and peat contain a large amount of water and volatile matters, and burn with abundant flame, often with smoke, from imperfect combustion. The harder fuels, such as anthracite and coke, burn with little flame and no smoke, and evolve little watery vapor. Fuels differ as to the amount of ash they leave. The best coal yields five per cent of ash, while many contain ten or even twenty per cent. The ash not only reduces the actual amount of carbon, but itself consumes heat in being fused into clinkers. The mineral oils are a valuable liquid fuel, one pound of crude petroleum or paraffin oil generating 20,000 heat units, as compared with 14,000 to 15,000 units gener-

ated from one pound of coal. For generating steam on board ships, etc., liquid fuel is superior to coal, in its efficiency as well as in the saving of storage space, and the elimination of the labor of stoking the furnaces. Natural gas and water gas are used to some extent as fuel.

Theoretically, the burning of one pound of carbon in oxygen evolves 14,544 English heat units, *i.e.*, enough to do the work called one horse power for five-and-a-half hours. Practical results, however, fall far short of this. In the Siemens furnace the objects to be heated are placed in an atmosphere of burning gas, atmospheric oxygen arriving by one inlet and the combustible gases by another, the two uniting as in the blowpipe flame. The calorific power of a fuel is the total amount of heat that can be obtained by its combustion. It is determined by burning a known weight of the fuel, and allowing all the heat to act upon a known weight of water. The apparatus used for this purpose is called a calorimeter. See COMBUSTION.

Fuero (fō-ā'rō), Spanish name for the old local codes of certain towns and districts, chiefly in the N. of Spain. The fueros are very ancient, and are regarded with jealous affection by the places that possess them. They are mostly of Basque and Gothic origin.

Fuerteventura (fwĕr-tā-vĕn-tō'rā), mountainous and volcanic island, second in size of the Canary Islands, and the most thinly populated of the group; is but little cultivated; area, 665 sq. m.; chief town, Puerto de Cabras. Pop. abt. 11,000.

Fug'ger, celebrated German family, now represented by two lines of princes and several lines of counts and "most illustrious counts." JOHANN FUGGER, a weaver of Graven, near Augsburg, was the founder of the family. It gained more influence from the success of his eldest son, JOHANN, who became a citizen of Augsburg, 1370, and died 1409. ANDREW FUGGER, eldest son of the second Johann, founded the noble line of Fugger vom Reh, which died out, 1583. The descendants of the younger line became leading bankers, miners, and merchants, and the family was ennobled in 1504 by Emperor Maximilian, who borrowed largely from them. Charles V was also a borrower from the house of Fugger, represented in his day chiefly by ANTONY and RAIMUND, who received the county of Kirchberg and Weissenheim, the title of counts, and princely privileges. They were stanch Roman Catholics, and used their money freely in opposing the Reformation. Several were distinguished soldiers and statesmen, and many were liberal patrons of art.

Fu'gitive, one who flees away; term applied (1) to fugitives from justice, who flee from one jurisdiction to another; and (2) to persons fleeing to avoid compulsory labor for others. Under Article 4, Section 2, of the Constitution of the U. S., Congress enacted laws in 1793 and 1850 for the rendition or return of fugitive slaves. The latter act contained provisions that intensified the hostility to slavery, and was repealed after the Civil War broke out.

Fugue (fūg), in music, a species of composition in which one voice or part seems to be perpetually flying away from another. Fugues are simple, double, or counter, the last being much the most complicated.

Fujiyama (fō-jē-yä'mä), or **Mount Fu'ji,** the highest mountain in Japan; is a dormant volcano said to have arisen in one night in 285 B.C., while at the same moment the earth near Kioto sank, and Lake Biwa was formed. The last eruption of Fuji took place, November 24, 1707, and continued until January 22, 1708. It stands between the provinces of Suruga and



MOUNT FUJI.

Kai, about 60 m. W. of Tokyo and the same distance from Yokohama, from both of which places it can be seen towering above the intervening mountains. It is an almost perfect cone, 12,365 ft. high, rising clear cut from the plain, and presenting the same appearance on every side. The summit, about 2½ m. in circuit, may be reached by four different paths. Fuji is one of the sacred mountains of Japan, and is visited by many pilgrims. It forms a prominent feature in Japanese decorative art.

Ful'da, town of Germany; in the electorate of Hesse-Cassel; on the Fulda; 67 m. NE. of Frankfort on the Main; the capital of a former principality of the same name; has a cathedral, built in the style of St. Peter's in Rome; the site of a famous mediæval monastery and abbey, and possessed a university, 1734–1803. The town has some manufactures. Pop. (1900) 16,900.

Fulgentius (fŭl-jĕn'shĭ-ŭs), **Fabius Claudius Gardianus, Saint,** abt. 478–533; African bishop; b. Leptis; chosen Bishop of Ruspina, or Ruspa, Numidia, by the Catholics, 508; called the Augustine of the sixth century; chief writings—on the Trinity, Predestination, Faith, and Arianism.

Ful'gurites, tubes of vitrified sand found in sandbanks and sandy soils; produced by the intense heat of electrical discharges, which fuses the sand together.

Full'er, Andrew, 1754–1815; English Baptist theologian; b. Wicken; pastor at Soham, 1755, and at Kettering, 1782; the first secretary of the Baptist Missionary Society, which he assisted in founding, 1792. His works include "The Gospel Worthy of all Acceptation," 1784; "The Calvinistic and Socinian Systems, Examined and Compared as to their Moral Tendency," 1794, which excited much controversy; many other treatises, sermons, etc.

Fuller, Margaret. See OSSOLI.

Fuller, Melville Weston, 1833– ; American jurist; b. Augusta, Me.; graduated at Bowdoin College, 1853; admitted to the bar, 1855; settled in Chicago, Ill., 1856; practiced there till 1888; delegate to the National Democratic conventions of 1864, 1872, 1876, and 1880; became Chief Justice of the U. S. Supreme Court, April 30, 1888.

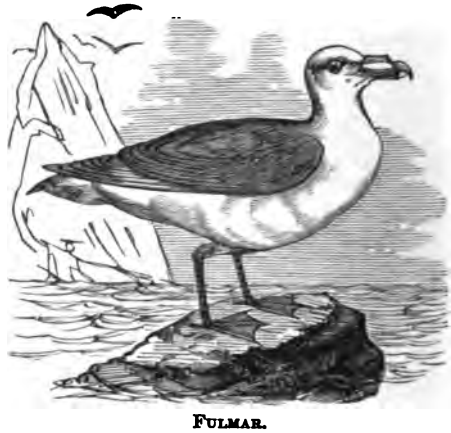
Fuller, Thomas, 1608–61; English clergyman; b. Aldwincle; prebendary of Salisbury and rector of Broad Windsor, Dorset. Abt. 1640 his eloquence secured for him the lectureship of the Savoy, London. In the civil war was a chaplain in the Royal army. In 1648 he became rector of Waltham Abbey, Essex; in 1658 chaplain to Lord Berkeley and rector of Cranford; and after the Restoration chaplain extraordinary to the king. Principal works, "Historie of the Holy Warre," "Good Thoughts in Bad Times," "Good Thoughts in Worse Times," "The Holy and Profane State," "Church History of Britain," and "History of the Worthies of England."

Fuller's Earth, greenish-white clay, chiefly found in Bedford, Kent, and Surrey in England, and at many points on the Continent. From one fourth to one fifth of the mass is alumina (the base of clay), the rest chiefly silica (sand) and water, with some lime and other ingredients. It was formerly much used by cloth dressers for cleansing the oil from woolen fabrics; whence its name.

Full'erton, Lady Georgiana Charlotte (GOWER), 1812–85; English author; b. Stafford; daughter of Lord Granville and wife of Alexander George Fullerton; followed her husband into the Roman Catholic Church; was distinguished for her benevolence and philanthropy. Her books, some thirty in number, include several novels, numerous lives of saints, memoirs of Catholic worthies, and translations from the French and the Italian.

Full'ing, operation by which fabrics made of carded wool are shrunk, thickened, and partially felted. The woven goods are scoured and boiled (to remove knots and lumps), then thoroughly soaped, and finally either beaten in the fulling stocks or passed between great rollers. This operation is much like the previous scouring, except that fuller's earth, hog's dung, and urine are used in the scouring, while soap and hot steam are used in the fulling proper. When fulled, the threads of the cloth are scarcely perceptible, the tendency to unravel is overcome, and the cloth is much shrunken, sometimes nearly one fourth in length and about one half in breadth.

Ful'mar, any one of several web-footed sea birds that feed on fish, dead whales, cirripeds, mollusks, etc. The best known is the fulmar or fulmar petrel of the N. Atlantic. This



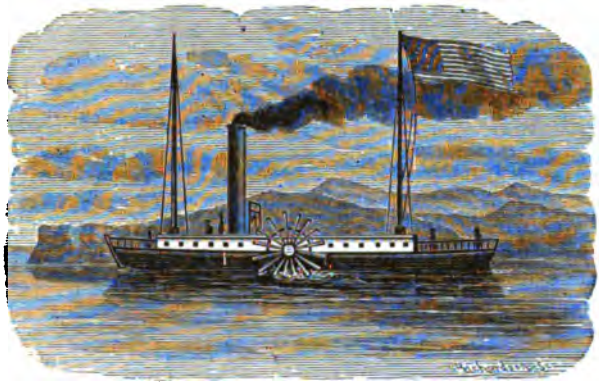
FULMAR.

bird is much sought for by the fowlers on the cliffs of St. Kilda, who gather its eggs (which are highly prized), its feathers and down, and the fish oil in its stomach, which is salable.

Fulmin'ic Ac'id, one of the several different forms of cyanic acid (all of which have the same composition, or are "isomeric"). Its compounds are distinguished for their explosiveness, in which they differ from those of cyanic acid. All attempts to obtain it isolated have failed, because as soon as formed it decomposes and explodes.

Ful'ton, Robert, 1765–1815; American inventor; b. Little Britain, Lancaster Co., Pa.; was at first a miniature painter in Philadelphia; went to London, 1786, where he became a pupil of Benjamin West and an inmate of his house. Later he became a civil engineer, and devised an improved mill for sawing marble, and invented machines for spinning flax and for making ropes, and an excavator for scooping out canals and aqueducts. In 1796 he published a treatise on the improvement of canals. In 1797 he settled in Paris, where he devised the submarine boat, afterwards styled the *Nautilus*, connected with which were submarine bombs, afterwards known as torpedoes. Having failed to induce either the French or the English governments to adopt this invention, he returned to the U. S. and obtained from Congress an appropriation for experiments. Various reports were made by the commissioners, but Commodore Rodgers pronounced Fulton's system impracticable. Fulton constructed a working model of a steamboat, 1803, and soon afterwards completed a vessel, which did not move with satisfactory speed. In 1807 he finished a boat, named the

Clermont, equipped with an engine made in England, which obtained on the Hudson a speed of 5 m. an hour. This was soon enlarged to a boat 140 ft. keel and 16½ ft. beam. So completely was the utility of the invention established that the Legislature extended the time of the exclusive privilege of navigating the waters of the state by steam, which had been granted to Robert Livingston, 1798, and later to him and Fulton jointly. Fulton soon put another large boat on the Hudson. In 1809 he obtained his first patent from the



THE CLERMONT.

U. S., and, 1811, took out a second patent for improvements in his boat and machinery. The power of the state to grant the steamboat monopoly was questioned in the courts, but the monopoly was held by Fulton and his partner during the lifetime of the former. Fulton also built several steamboats for other parts of the country, and a war steamer for the Government. In 1909 there was in New York a joint Hudson-Fulton celebration commemorating at the same time the discovery of the Hudson River and the inauguration of steam navigation. Reproductions of Hudson's *Half Moon* and Fulton's *Clermont* figured in the celebration.

Ful'via, Roman lady; daughter of M. Fulvius Bambalio and wife of P. Clodius, by whom she had a daughter, Clodia, afterwards wife of Augustus. After the murder of Clodius, she married C. Scribonius Curio, and her third husband was Mark Antony, whom she loved sincerely, and for whose sake she abandoned the dissolute habits of her earlier life, entering heartily into his ambitions and behaving with cruelty to his enemies. When her husband was dallying with Cleopatra she created an insurrection to recall him, but was driven from Italy. At Athens she met her husband, and was treated by him with harshness, whereupon she retired to Sicyon, and died of chagrin (40 B.C.).

Fumbi'na. See ADAMAWA.

Fumiga'tion, application of smoke, gases, or vapors for various purposes, as to produce or destroy odors; to bleach in certain manufacturing processes—to destroy infection; to act as a local application in diseases of the air passages, and to form a part of the ritual in certain religious ceremonies. The fumes of burning sulphur are employed for bleaching straw. For medicinal purposes the fumes of stramonium, tobacco, nascent muriate of ammonia, oxide of mercury, and of various gum resins are sometimes employed. See DISINFECTION.

Fu'mitory, weed of Europe, now naturalized in the U. S.; belonging to the fumitory family; is a handsome herb, with a strong, disagreeable taste; its sap abounds in saline matter and a principle called fumarin. This herb is in parts of Europe valued as a tonic, diaphoretic, and aperient, and is useful in skin diseases. The climbing fumitory of the U. S., called also mountain fringe, is a delicate biennial, the *Adlumia cirrosa* of the same family, which is very fine in cultivation when trained in a shady place on latticework.

Funchal (fŏn-shäl'), capital of the island of Madeira; on its S. coast; is a handsome place, with a good harbor, and the center of the wine trade of the island, and is a bishop's see. The climate is healthful, and the place has a hospital for consumptives. Pop. (1900) 20,844.

Func'tion, in mathematics, a quantity which is conceived to depend upon, or be produced by, some other quantity to which values can be assigned at pleasure. The latter quantity is called an independent variable. We then conceive that for every value we choose to assign to the independent variable a certain value of the function will result. Function, expressed as equal to a certain algebraic expression containing an independent variable, is called an explicit function. There may be as many kinds of explicit functions as we can form algebraic expressions, and they are therefore classified according to the nature of the expression which represents them. Entire functions are of the nature of an integer, or entire number, and the formation of which involves no operation except addition, subtraction, and multiplication. A rational function is one which involves only the operations of addition, subtraction, multiplication, and division. An irrational function is one which requires the extraction of a root and which cannot be represented by a rational quantity. The three classes of functions just defined are sometimes called algebraic, and all others transcendental. An implicit function is one which is expressed as the unknown quantity or root of an equation. Such a root depends for its value upon the coefficients of the unknown quantity, and is therefore considered as a function of those coefficients.

Fun'dy, Bay of, arm of the Atlantic extending NE. between New Brunswick on the NW. and Nova Scotia on the SE.; its NE. extrem-

ity divides into two parts—Chignecto Channel, and Minas Channel and Basin. The bay is deep, but its navigation is dangerous. It is remarkable for its extraordinary tides; spring tides, in parts of the Bay of Fundy, have been known to rise over 70 ft., and come pouring in as an immense "bore." The bay receives the waters of the St. John and St. Croix rivers.

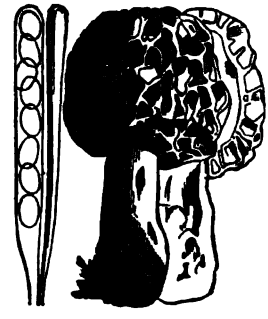
Fünen (fü'nĕn), **or Fuh'nen** (Danish FYEN), next to Seeland, the largest of the Danish Islands; separated from Seeland by the Great Belt and from Jutland by the Little Belt; area, 1,123 sq. m.; pop. (1901) 240,359; principal towns, Odense, Svendborg, and Nyborg.

Fu'neral, or Funeral Rites. The two principal modes of disposal of dead bodies are burial in the earth or sea, and cremation, incineration, or burning. Burials are either in graves, in which the body, inclosed in a coffin or wrapped in graveclothes, is covered directly with the earth, or is placed in a vault, tomb, or sepulcher. Bodies buried in the sea, from ships too far from the land to permit interment, are placed in a canvas sack and committed to the sea, weights being attached to the feet. Burial is usually accompanied by obsequies or ceremonies prompted by the religious faith and sentiments. Masses and requiems are prescribed in the rituals of some Christian churches; eulogies or formal sermons are pronounced at or soon after the funerals of distinguished persons. Music is not universal at funerals; when used, it is either in a minor key and expressive of grief, or of a kind intended to inspire hope and religious faith. A catafalque or hearse is employed for the support of the coffin; and funeral cars (also called hearses) are almost uniformly employed in carrying the dead to the grave. Many W. aboriginal tribes suspended their dead in trees or placed them upon raised platforms—probably to keep them from ravenous beasts. Some Indian tribes carry the bones of the dead with them on their migrations; others have the greatest horror of ever speaking of the dead; among some tribes prevails a system of ancestral worship. The Parsees expose their dead until the kites and vultures have removed the soft tissues, when the bones are placed in an ossuary.

Fünfkirchen fünf'kĭrkh-ĕn), literal translation, ."Five Churches"; town of Hungary; capital of the county of Baranya; 139 m. S. by W. of Budapest; has a cathedral—the largest and handsomest church building in Hungary; a college and other educational institutions; is a bishop's see, established 1009. Near the town are coal mines, marble quarries, and vineyards, and it has manufactures of woolens, flannels, brandy, paper, leather, and majolica. There are interesting remains of the Roman and Turkish periods, for the Turks held this town, 1543–1686. Pop. (1891) 33,780.

Fungi (fün'jī), extensive group of cryptogamic plants, generally known in its divisions as mushrooms, toadstools (a popular name for poisonous mushrooms), rusts, smuts, bunt, and mildews. With rare exceptions, they are parasitic, growing on and drawing their nourishment (or at least a part of it) from the substance of another plant. Fungi occur in all parts of the globe, but most abundantly in moist, temperate zones. They are found wherever there is decaying vegetation, on which they feed; they often prey on living tissues, which they destroy; no vegetation is free from their ravages when under influences favorable to their growth.

Fungi are of purely cellular growth. They form no woody fiber like flowering plants, though many become corky, woody, and horny in the course of their growth, nor do they form chlorophyl (green coloring matter) in their tissues. They consist of aggregations of homogeneous cells, but occur in a great variety of forms. Their position is between algæ and lichens, into which classes they gradually merge. The larger fleshy forms present an endless variety of tints. Their texture is as variable as their color. Some are almost fluid, others fleshy, papery, leathery, corky, or hard and horny. Their size is equally various, from mere specks to masses some feet in girth. Their rapid growth is astonishing. Puffballs sometimes grow 6 in. in diameter in a night.



COMMON MOREL WITH SPORE-SAC AT SIDE.

Prof. Mordecai C. Cooke, author of "British Edible Fungi," speaks of the uses of fungi as follows: "In European countries the common mushroom enjoys the widest popularity as an esculent, especially the cultivated varieties. The meadow mushroom is scarcely inferior, though stronger in flavor, and is preferred by many to the cultivated species. In France the champignon is largely eaten, and in Austria *Collybia extuberans*, which has no admirers in England, finds a constant place in the markets during the summer. Truffles and morels are favorites not only in Europe, but also in the vales of Kashmir. The great puffball is increasing in reputation as a breakfast delicacy in Great Britain, while *Lactarius deliciosus*, the chantarelle, and the hedgehog fungus have each their circle of admirers. Numerous other species are also eaten, although they are never found in the public markets. *Boletus edulis* cut in slices and dried may be purchased throughout the year in most of the Continental

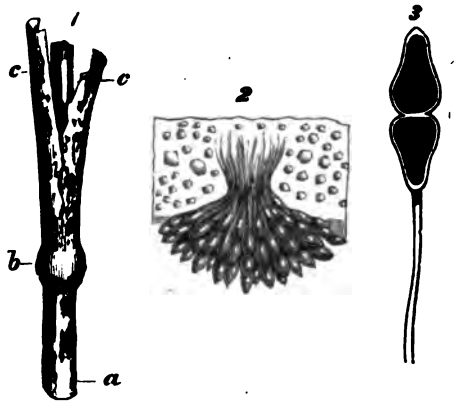


BOLETUS EDULIS.



1. Boletus Edulis
2. The Morel
3. The Coral Fungus
4. Puff Balls
5. Shaggy-Mane Mushroom
6. The Oyster Mushroom
7. The Mushroom
8. Fly Mushroom
9. Beefsteak Mu
10. Agaricus (Spr

pore, and another dried agaric is sent from



1. Wheat straw attacked by mildew: *a*, the stem on which is the swelling; *b*, from which has grown the sheaflike leaf *c c*. 2. Cluster of spores (magnified). 3. Single spore (magnified 300 times).

the Kabul hills into the plains of NW. India. Several species of Cyttaria are eaten in the S. parts of S. America, and in Australia the *Mylitta australis* is a favorite article of food."

Fun'gicides. See INSECTICIDES and FUNGICIDES.

Fur, the short, fine, soft coat or covering of some animals; in general shorter, finer, and softer than hair, but there is no definite line of distinction. The use of the skins of wool-bearing and fur-bearing animals as convenient and readily adapted clothing is general among all savage and half-civilized nations in cold climates, and some of those in semitropical regions; but apart from the use of these skins of animals as clothing, there early grew up a demand for the finer and handsomer furs for ornament and luxury. They were used in decorating the tabernacle in the wilderness. Costly furs formed a part of the luxurious coverings of couches in the palace of Sardanapalus. The Chinese and Japanese have used furs as luxuries for at least 2,500 years (the Chinese probably more than 3,000), and the robes of ermine, sable, and fiery-fox furs worn by the nobles of both nations are remarkable for their beauty. The choicest and finest furs were very generally worn as articles of luxury by the aristocracy in the decline of the Roman Empire.

The tribes of Goths, Huns, and Ostrogoths which migrated in hosts from the N. carried with them the choice furs of the arctic regions, and during the Middle Ages they came into use throughout S. and central Europe. Sumptuary decrees were issued abt. A.D. 1200 by Richard I of England and Philip II of France, prohibiting the wearing of costly furs either by princes or people, but before the close of that century Louis IX of France appeared in public with a surcoat lined with the skins of 746 ermines. Italy, each family being restricted to a single kind of fur, and permitted to put in its armorial bearings a figure of the animal producing that fur. Thus the ermine, the sable, the Hungarian squirrel, the Podolian or fiery fox, and possibly also the beaver and the wolf, came to find a place in the coats of arms of some of the highest aristocracy of Continental Europe.

The furs principally worn are those of the Alaska seal or sea otter; the fur seal, of which not over 300,000 are taken annually; the sable, usually called the Russian sable, though the finest specimens come from NE. Siberia or Kamchatka. The pine marten or Hudson Bay sable is sometimes colored and passed off as the Russian sable. The stone marten is of inferior quality, and of yellowish-brown color. It is often colored in Europe, where it is much used. The fisher marten is a scarce and valuable fur, and is sold mostly in Europe. The mink is a favorite fur in the U. S. The best specimens are a dark chestnut brown, approaching to black, and resemble the Russian sable in color and fineness. The ermine, called in Great Britain the stoat, is very abundant in the N. parts of America, Europe, and Asia. It is pure white in winter, except the tip of its tail, which is jet black; in summer it is yellowish brown. Its fur was once allowed to be worn only by the highest nobility and on the official robes of judges and magistrates. The fur of the skunk is fine, and the black portion beautiful.

Among other furs are Siberian squirrel, muskrat, French rabbit or coney, common rabbit, wildcat, house cat, badger, and raccoon or Virginia opossum. Most of these skins are exported to Germany and Poland, where they are used for trimming overcoats. The choicer grades of fox furs are used to some extent for trimming, but rarely, if at all, for muffs, collars, or tippets. The color of the white fox is only white in winter; in summer he is brown gray, or bluish, and is then called a cross o pied fox. The choicest of all the arctic vari ties of fox is the silver fox. Its color when prime fur is a deep, glossy, bluish black, wi silvery grizzle on the forehead and flanks. skins of the different species of bears, w Canada lynxes, badgers, panthers, and cats are made up into carriage robes, in great demand; and, until the buffal nearly extinct, its skin was in gener this purpose in the U. S. and Canad

Fu'ries, or **Fu'riæ.** See EUMENI

Fu'rius, the name of many Rom characters, mostly of the patricia but some plebeians bore the na family was very old; its orig but the name is common or Tusculum, from which it has it came to Rome from tha famous of all was L. Fu overthrew the Gauls in Cremona, 200 B.C., and r

Fur'long, 40 rods in eighth of an English or

responding to the *stadium*, which was the eighth of a Roman mile. There are also several local furlongs, and the word is sometimes used for the name of a square or land measure.

Fur'nace, in general, a structure or inclosed place in which heat is generated by the combustion of fuel for a particular purpose; specifically, a structure of iron or brick lined with some refractory substance, as fire brick, for the generation of intense heat for use in some process of the industrial arts, especially in the treatment and utilization of metals and minerals. Nearly all important types of furnaces are employed in iron and steel manufacture, and may be classed as follows:

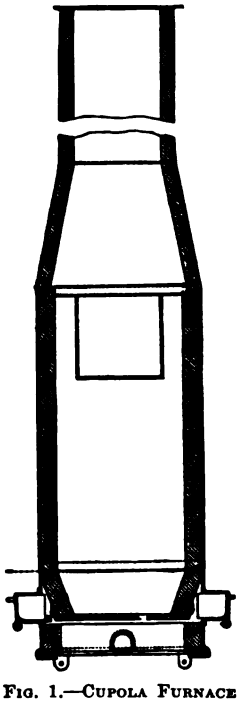


FIG. 1.—CUPOLA FURNACE (VERTICAL SECTION).

(*a*) According to the methods of applying heat. (1) *Open fires*, in which the material under treatment is heated in the fuel chamber either in contact with the fuel or with the heat radiated directly from it, or with both. Such furnaces are used in crucible steel works for heating small ingots and bars. Iron smelting or blast furnaces are of this class, as are also the different kinds of furnace used for heating steam boilers. The metallurgical furnaces of this class are the cupolas for melting iron for castings, etc. (See figure.) Modifications of this style of furnace are the smith's "fire" in all its forms; the pot furnace for melting steel in crucibles; also the usual forms of cementing furnaces. This variety of furnace is used for heating wrought iron in contact with carbon to make a carbonized iron called blister steel. In pot and cementing furnaces the vessel that holds the metal, rather than the metal itself, is in direct contact with the fire. All forms of apparatus for heating air for domestic, metallurgical, or manufacturing purposes, by means of conducting walls, placed between the heat-imparting medium and the air to be heated, are properly classified as "stoves" and "blast furnaces." The Bessemer converter and the "sponge" or ore-reducing furnace are of this class, and are used in the manufacture of steel. (2) *Reverberatory furnaces*, in which the material under treatment is heated in a chamber separate from and adjoining the fuel chamber by means of the hot, gaseous products of combustion and by radiation from the heated walls of the chamber. Most of the furnaces used in wrought-iron and steel manufacture are of this class. The principal varieties are the puddling furnace, the "heating" furnace, the open-hearth or Siemens-Martin steel furnace, and the "air" furnace, which is a reverberatory melting furnace. Fig. 2 shows a vertical section of a reverberatory furnace for solid fuel as employed for heating steel masses of from 300 to 5,000 lbs., while in Figs. 3 and 4 two forms of a reverberatory melting furnace or air furnace for solid fuel are illustrated.

(*b*) Furnaces are further classified according to the method of utilizing the fuel. (1) *Coal furnaces*, in which the heat utilized is the direct product of the combustion of solid fuel. (2) *Gas furnaces*, in which the fuel enters the furnace in the form of a gas; in metallurgical furnaces this is chiefly carbon monoxide; if bituminous coal, wood, or peat is employed, some hydrocarbons are present. To say that in the coal furnace fuel is used where it is burned, and that in the gas furnace fuel is made into gas in one place and used in another, would not accurately distinguish between the two varieties, because the gas producer may be a part of the furnace where the heat is utilized, and yet the combustion which produces the carbon-monoxide gas may be a distinct chemical process from the combustion which generates the utilized heat. The blast furnace and the cupola are necessarily coal

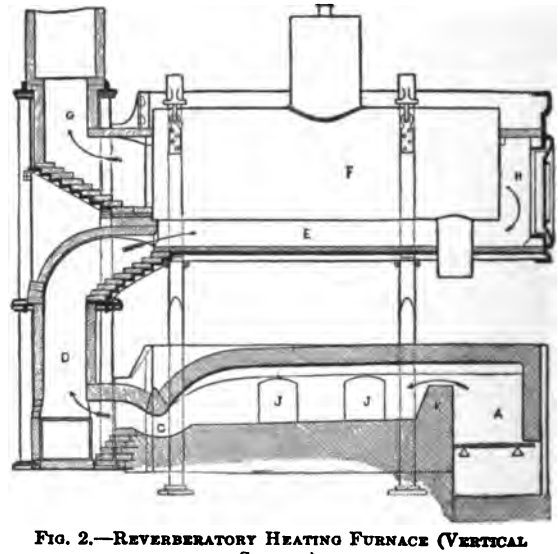


FIG. 2.—REVERBERATORY HEATING FURNACE (VERTICAL SECTION).

A. Grate. *J*. Doors through which heated masses are withdrawn. *K*. Bridge which shields metal from direct flame. *C*. Contracted throat tending to check expansion and maintain temperature of burning gases at this point. *D*. Flue up which hot products of combustion pass, thence under the boiler, *E*, through boiler flues to chimney *G*. The tubes are accessible for cleaning through the doors *H*.

furnaces; the other furnaces enumerated whether the heat is applied in the chambe where the combustion takes place or in a adjoining chamber, may be either coal or ga furnaces. In the employment of furnaces i manufacturing plants the variety best adapte to the special industry is used, and for it

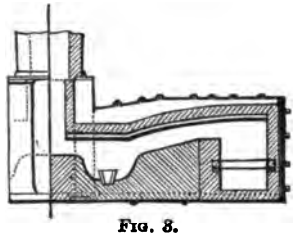


FIG. 3.

description reference must be made to the text-books on that particular industry, but in a general way they are all modifications of the typical forms referred to here. In those arts where fuel is used on the largest scale, such as the manufacture of wrought iron, steel, and glass, and where the highest temperatures are

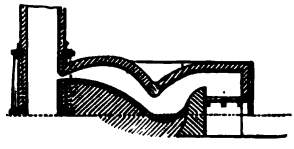


FIG. 4.

required, the greatest development has been in the use of gaseous fuel, and its regeneration by means of the escaping heat of the furnace. One, at least, of the most important modern manufactures—that of open-hearth steel—is the direct result of the regenerative gas furnace. See HEAT.

Furnes (fürn), town of Belgium; province of W. Flanders; at the junction of three canals; 13 m. E. by N. of Dunkirk, France; has manufactures of linen and leather, and a large trade in grain, butter, cheese, and linen. Noticeable among its public buildings are the Church of Walpurgis (ninth century), and the townhall (thirteenth century).

Fur'niture, that with which anything is furnished or supplied, especially articles used in a dwelling house, office, etc. The Egyptians had chairs, wooden bedsteads and couches, often elaborately decorated; gold and silver plate, vases, dishes, spoons, and other articles of wood, carved and painted, and sometimes inlaid with glass or ivory. The people of India have been for centuries makers of splendid articles of both use and beauty. The ancient peoples of Asia Minor had couches and thrones, bedside tables, stoves, chests, coffers, and massive dishes of gold and silver. The Greeks, excepting the Lacedæmonians, reclined at their meals upon triclinia or couches. The bedsteads of the wealthy were the most costly of all their furniture, but their treasure coffers, closets for rolls of papyrus or parchment,

seats were thronelike chairs with footstools, high backs, but even canopies; the tables were sometimes less permanent. The decorative table was apt to be a ponderous thing, sometimes combined with shelves or cupboards below, for the two or three books of the scholar's library, sometimes having a revolving reading desk above.

With the fifteenth century the forms were more light, the sculpture more delicate, the ironwork hammered and chased as finely as bronze; the pieces of furniture more numerous, more varied, and serving more numerous and varied requirements. Most of all, painting had almost disappeared from furniture. For the two centuries beginning with the year 1500 the furniture was again in the main like that of the Middle Ages, massive, of plain, solid wood, without upholstery in our modern sense. The great change appeared with the introduction of upholstered furniture; there is record of stuffing as well as of covering a textile fabric or leather as early as the fourteenth century, but there was not much upholstered furniture before the beginning of the seventeenth century. Then all at once, in the times of Louis XIII of France, James I of England, and their contemporaries, the seats of armchairs and of chairs appeared as covered with leather or brocade, sufficiently stuffed and ornamented with rows of nails and fringes. Later, and under Louis XIV, the seats made for elegant rooms put on the air familiar to us in the nineteenth century—the seats, backs, and arms were all stuffed and covered alike; pieces of tapestry or silk damask were woven for the purpose, and fitted the wooden frames accurately; the forms of the wooden frames, previously square and firm, became yielding, and, as it were, pliant in the curves they affected; the sofa took the place of the settle; pieces of furniture were made in sets, the two armchairs and four or six chairs being covered with the same pattern of tapestry, as well as alike in the woodwork.

During the reign of Louis XVI there was a return to the more natural forms in furniture. Straight legs and straight horizontal pieces became the fashion, accompanied by extreme lightness and delicacy, and the use of exquisite ornamentation by means of veneers and inlays of metal and shell. The most dainty and charming furniture known to us is that of France between 1750 and 1780. In England, the Chippendale style, 1720–1800, characterized by the traceried splat, bow-shaped back and cabriole legs, was replaced abt. 1800 by the "Empire," which gave claw feet and rolling (Egyptian) backs, modified in America by a covering of horsehair. A return abt. 1868 to Gothic lines, relieved by arches and spindles, was followed by the Romanesque.

Many articles of furniture are distinctly American, such as the rocking-chair and most of the combination pieces, like the bureau and folding-bed. Woods used for furniture are varied, and subject to change of fashion. Mahogany, maple, and black walnut, used in the early nineteenth century, were followed by cherry and ash, and, next, by oak, which has retained its popularity, though mahogany is much used for dining-room and drawing-room furniture.

Fur'nivall, Frederick James, 1825– ; English philologist; b. Egham, Surrey; a lawyer by profession, he taught for ten years in the Workingmen's College, of which he was a founder. Later he took up the study of philology, and organized societies for the publication of the original texts of early English books. Since 1854, has been honorary secretary of the Philological Society, and, on his sixtieth birthday, he received the degree of Ph.D. from the Univ. of Berlin. He has published some thirty editions of classical English texts, the best known being that of the "Canterbury Tales."

Fürst, Julius, 1805–73; Polish Orientalist; b. Zerkowo, Prussian Poland; before 1829 was converted from Jewish orthodoxy; became a journalist in Leipzig, 1833; later a lecturer at the university there; in 1864, was made a professor. Had a remarkable knowledge of rabbinical literature; published historical, critical, and lexicographical works, including "History of Jewish General and Literary Culture in Asia," and "History of Biblical Literature and of Hellenico-Judaic Letters"; edited *Der Orient*, 1840–51.

Fu'runcle. See BOIL.

Furze (fėrz), or **Gorse,** the *Ulex europæus*, an interesting Old World shrub of the *Leguminosæ*, having numerous solitary golden-yellow flowers of much beauty. It has several varieties, some of which are cultivated in gardens. It is also grown as a cover to foxes and as sheep pasture. In Belgium the waste, sandy lands yield large crops of furze, which is gathered when green, cut fine in a mill, and fed to live stock as forage.

Fusan (fō-sän'), Chinese, literally "kettle mountain," one of the open ports of Korea; on the SE. coast of the peninsula, and about 10 m. from the Naktong River; is locally called Kan (the post), the Japanese having maintained a military station there almost continuously since 1592. Kan is neatly built, in the Japanese style, and contains, besides the consulate and the warehouses of the trading companies, a chamber of commerce, a bank, and a hospital. The harbor is landlocked, large, and deep. The principal exports are rice, beans, and hides. Pop. abt. 16,800. About 3 m. from Kan, on the N. side of the harbor, is Fusan proper, consisting of an old and a new city, the former walled. A hill back of the city, bearing a fancied resemblance to an inverted kettle, gives Fusan its name.

Fusang', country said to have been visited in the fifth century by a Buddhist monk named Hwei-shin, and so called from a tree, supposed to have been the Mexican aloe, found growing there. Fusang has been identified by Charles G. Leland and others with Mexico or some part of the N. American continent bordering on the Pacific, and by Klaproth and many others with Japan.

Fuse. See FUZE.

Fusee', in the machinery of watches and chronometers, a cone spirally grooved, con-

nected with a chain which may be wound upon the grooved cone. One end of this chain is attached to the base of the cone, the other to the barrel or box containing the mainspring, which operates through the fusee the wheels connected in train to the arbor of the latter. The barrel, when the watch is wound up, rotates, being moved by the uncoiling of the spring. As this uncoils it loses its elastic force, but as a compensation the chain, unwinding from the peak of the cone, gains leverage, since, as the fusee rotates, the working point or angle of the chain continually approaches the base of the fusee. Thus the lengthening lever—the changing radius of the cone—gives the weakening spring more lever power to overcome the resistance of the wheels, and so a uniform rate of driving force is maintained. In watches the fusee is largely displaced with other devices for the same purpose.

Fuseli (fū'zĕ-lē), **Henry**, or **Fuessli** (fŭs'lē), **Heinrich**, 1741–1825; Swiss historical painter; b. Zurich; son of Johann Caspar Fuessli, portrait painter (1707–81). He entered the Church ministry, but left it after two years, and, visiting England, 1765–67, began the study of painting; studied in Italy, 1770–79, and, returning to London, attracted public notice by a picture, "The Nightmare," in 1782; was elected a Royal Academician in 1790, and a professor in the Academy, 1799. He lectured on art and wrote eloquently on art subjects, but his pictures are deficient in technical qualities and confused in composition.

Fu'sel Oil, collective name for a variety of alcohols and compound ethers produced during vinous fermentation, and which pass over with the alcohol upon distillation. It is, in fact, to the fusel oil that spirits owe their distinguishing qualities; for when it is completely removed from them, ordinary (*i.e.*, ethyl) alcohol, more or less dilute, alone remains. Fusel oil varies with the material from which the spirits are prepared, but both that from potatoes and that from Indian corn consist chiefly of amyl alcohol.

Amyl alcohol is often called fusel oil, even when freed entirely from the other alcohols, etc. It is a colorless liquid, having a peculiar sickening odor which causes coughing. It has a burning taste. Sp. gr. 0.811 at 19° C.; boils at 132° C.; burns with a white smoky flame; freezes at —22° C.; soluble in alcohol and in ether; nearly insoluble in water. The ordinary amyl alcohol consists of two liquids having the same composition and vapor density, but differing in relation to polarized light. Some of the compound ethers of amyl derived from this alcohol, as the acetate, butyrate, valerianate, etc., constitute the fruit essences—strawberry, pineapple, banana, apple, pear, etc., now generally used for flavoring confectionery, sirups, etc.

Fusibil'ity, property by which solids become fluid when heated. Most solids are fusible; some, however, undergo decomposition without fusing. The temperature at which solids melt (the melting point) differs greatly for differ-

name and composition of the principal fusible alloys, all of which can easily be made by simply melting the constituents together in the proper proportions:

Name.	Bismuth.	Lead.	Tin.	Cadmium.	Mercury.	Melting Point.
Newton's.	50	31.25	18.75	.....	.....	94.5° C. = 202° F.
Rose's....	50	28.10	24.1	.....	.....	95° C. = 203° F.
d'Arcet's.	50	25.0	25.0	.....	.....	94° C. = 201° F.
d'Arcet's with mercury...	50	25.0	25.0	.....	250.0	45° C. = 113° F.
Wood's ..	50	25.0	12.5	12.5	.....	65° C. = 149° F.
Lipowitz's	50	26.9	12.78	10.4	.....	65° C. = 149° F.
Guthrie's Eutectic	50	20.55	21.10	14.03	.....	Stated to have the lowest melting-point.

D'Arcet's alloy is a remarkable one, for, when it cools from fusion, it expands while soft, and when used for taking impressions of dies reproduces the finest lines with the greatest accuracy. An alloy containing cadmium is used for filling teeth, and is applied in the melted state. Plugs of fusible metal, mixed to fuse at certain definite temperatures, have been used as safety valves for steam boilers. See Metals; Metallurgy.

Fus'tian, cotton fabric resembling velvet. In addition to the usual warp and weft there is an additional weft, which is brought above the surface in loops. When these are cut the ends rising above the surface produce a short fur, which hides the tissue beneath. This is smoothed by shearing, singeing, and brushing.

Fus'tic, several yellow dye-woods. True fustic, tree fustic, yellow Brazil wood, old fustic, etc., is the wood of *Morus* (*Broussonetia* or *Maclura*) *tinctoria*, a fine large tree of the order *Moraceæ* growing in the W. Indies and S. and Central America. It affords a permanent and valuable yellow dye, and is largely exported to Europe and the U. S. Bastard fustic is believed to be a smaller variety of the same wood, but is inferior in quality. No kind of fustic is of practical value except when compounded with other dyestuffs. The fustics are employed for cottons, woolens, and silks.

Fu'ta Jallon', S. part of French Senegambia; the highest of that portion of W. Africa in which the rivers Senegal, Gambia, and Grande have their sources. Its elevation may not average much above 2,000 ft., but some peaks are so high that they are said to be occasionally covered with snow during the rainy season. Timbo is the capital.

Fu'ture State, in brief, the state of man after death; here considered according to the doctrine of the Roman Catholic Church as set forth by Bishop John J. Keane; of the Orthodox Protestant churches by Prof. William G. T. Shedd, and according to the non-Orthodox theories by Prof. Samuel M. Jackson.

I. *Roman Catholic Doctrine.*—The Catholic Church teaches that the soul of each man, immediately after death, is judged and assigned to one of three states—heaven, hell, or purgatory. Heaven consists of the eternal beatific vision of God, to which those are admitted who pass from earth without stain, either because their life has been sinless or because their transgressions have been fully expiated. Hell is likewise everlasting, and is the infliction of a twofold punishment. Those who die in original sin only are there deprived of the beatific vision—*pœna damni*; those who die in grievous actual sin are subjected, moreover, to unending torment—*pœna sensus*. Purgatory is a temporary middle state in which those who depart this life in the grace of God are detained, to expiate, by suffering, the slighter offenses not forgiven before death, or to complete the expiation of grievous sins which had been forgiven. At the final and general judgment, the Church teaches that soul and body shall be reunited, and that the risen body shall share for eternity the existence of the soul—the glory of heaven or the torments of hell.

II. *Orthodox Protestant Doctrine.*—This is commonly expressed under the subjects of (1) The Intermediate State, (2) The Resurrection, (3) The Last Judgment, (4) The Blessedness of the Redeemed, (5) The Punishment of the Lost. (1) The doctrine of the intermediate state has been somewhat fluctuating in form, owing to the paucity of the Scripture data. The representation in the parable of Lazarus and Dives has furnished the basis of the general statement that the believer is happy and the unbeliever is wretched between death and the final judgment. The Protestant affirms that at death the soul of a believer is made perfect in holiness. He denies purgatorial pains and purification, as well as an unconscious sleep of the soul between death and the resurrection. (2) The doctrine of the resurrection of the body was from the beginning a cardinal and striking tenet of Christianity. Most of the early Fathers believed in the resuscitation of the very same body materially. The Alexandrine school alone adopted a spiritual theory of the resurrection. Origen asserted that a belief in the resurrection of the body is not absolutely essential to the profession of Christianity, provided the immortality of the soul be maintained. In the Protestant Church the existence of a real body, and of a body that preserves the personal identity, is affirmed. (3) The doctrine of the last judgment was, from the first, immediately connected with that of the resurrection of the body. The Fathers founded their views of the day of doom on the representations and imagery of Scripture. In the Middle Ages representations varied with the bent of the individual theologian. In the modern Church the course of thought on this doctrine has been similar to that in the ancient and mediæval. The symbols of the different Protestant communions explicitly affirm a day of judgment at the end of the world, but enter into no description. (4) That the blessedness of the redeemed is endless has been the uniform faith of the Church. Justin Martyr regards the blessedness of heaven as consisting mainly in the increase of the happiness of the millennial reign. Origen holds that the

blessed pass from one heaven to another as they advance in holiness. Augustine believed that the heavenly happiness consists in the enjoyment of peace which passes knowledge and the beatific vision of God. The Schoolmen divided heaven into three parts: the visible heaven, or the firmament; the spiritual heaven, where saints and angels dwell; and the intellectual heaven, where the beatific vision of the Trinity is enjoyed. The modern Church maintains the doctrine of everlasting blessedness in substantially the same form with the ancient and mediæval. (5) The punishment inflicted on the lost was regarded by the ancient Church as endless. The principal exception appears in the Alexandrine school, represented by Clement and Origen; but Clement is careful to say that the doctrine of endless perdition must be preached, in order to deter men from sin. The mediæval Church was likewise a unit in holding to the endlessness of punishment. The modern Church has also received the historical faith on the subject, though a tendency appears in individuals and parties to the doctrine of a second probation and the final restoration of all mankind.

III. *Non-Orthodox Theories.*—Two theories respecting the future state of those who die impenitent, which differ radically from one another and equally from the Church theory, have found many adherents. (1) The theory of conditional immortality, *i.e.*, that the human soul is not naturally immortal. It asserts that immortality or eternal life is given only to those who have faith in Christ. Those destitute of such faith do at death pass into an estate of punishment, and are finally destroyed. (2) The theory of restorationism, *i.e.*, that the time will come when the impenitent will repent, and then be restored to the favor of God. Such passages as Rom. v, 18; xi, 32; I Cor. xv, 22, are appealed to, and much use is made of the idea that the object of punishment in the future life is remedial and reformatory. The theory has been a favorite with speculative minds from Origen to the present time; it is predominant in the Universalist Church. See IMMORTALITY.

Fuze, device by means of which an explosion may be effected at a safe distance from its destructive action. The charge may be in motion or be stationary, and a short, a long, or an indefinite time may be desirable between the act of the operator and its effect. For projectiles, including shells, shrapnel, etc., fuzes are classified as time, percussion, and combination. Time fuzes consist of cases of paper, wood, or metal containing the ingredients

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G, seventh letter in the Latin alphabet, and in others derived directly from it, as the English, French, German, and Italian. In Hebrew, Greek, and some other alphabets of Phœnician origin, it is the third letter. In English it has two distinct sounds: the hard, as in *get*, and the soft (also represented by J), as in *gem*.

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Spanish before *ua*, and as a terminal in Danish. See ABBREVIATIONS.

G, in music, the fifth degree in the ascending scale of C, major or minor, being the dominant in that scale. *Gamut G* is the note on the lowest line of the bass stave, a seventh below F on the clef line. *Double G* is one octave lower than gamut G. G *dur* is the German for G major, and G *moll* for G minor. *Gis*, in German, is G sharp. G *in alt*, the first note in alt, situated one octave above the treble clef line. G *in altissimo*, a note one octave higher than G in alt.

Ga'al (Hebrew "contempt"), in the Old Testament, son of Ebed and father of Shechem; joined the Shechemites against Abimelech, son of Gideon; led them to battle; defeated and afterwards excluded from the city. (Judges ix, 26–41; Gen. xxxiv, 2–6.)

Gab'bro, a rather coarse-grained granular rock; in structure and origin analogous to granite. Mineralogically it is essentially pyroxene and triclinic feldspar; it also contains some iron oxide, usually ilmenite. The name gabbro was first used by Italian miners to designate a black serpentine. It was introduced in its present meaning by the German geologist, Von Buch, in 1810. The best-known gabbros are those of N. Italy and the Alps of Silesia and the Hartz Mountains in Germany. In the U. S. gabbros are found in the White Mountains, on the N. shore of Lake Superior, in Minnesota, and near Baltimore, Md.

Gabii (gā'bĭ-ī), an ancient Latin city which stood 12 m. E. of Rome, on the banks of a lake in a volcanic crater. In early Roman days it was important, but it decayed, as allusions in Cicero, Horace, and Juvenal show. It afterwards revived and became a bishop's see, but is now deserted.

Gabin'ius, Aulus, d. abt. 47 B.C.; Roman politician; became tribune at Rome in 66 B.C.; served under Pompey, 64–63, and gained immense wealth; was prætor in 61, consul in 58, proconsul in Syria and Judea, 57; restored Ptolemy Auletes in 55, and was convicted of corruption and exiled. He was recalled toward the end of 49 by Cæsar, and stationed with troops in Illyricum, where he died abt. 47 B.C.

Ga'ble, that part of the outer wall of a building which lies between the slopes of the roof and above the upper line of the side walls; called in classic architecture the *pediment*. The bounding lines of the gable were in the richer forms of the Gothic treated with great freedom and profusely decorated, and often broken by corbie steps and other diversities. Small gables are called gablets, and are introduced into many Gothic exteriors. The term "gable wall" is used by builders in some cities of the U. S. to designate the side walls or party walls of houses built in continuous blocks, irrespective of the actual form of these walls. When inclosed, as in classic architecture, between a horizontal cornice below and "raking" cornices above, it is called a *pediment*.

Gablenz (gä'blĕnts), **Ludwig Karl Wilhelm** (Baron von), 1814–74; Austrian general; son of the Saxon Lieut.-gen. Gablenz; b. Jena; served first in the Saxon horse guard, but, 1833, entered the Austrian service; in 1848, fought in Italy under Radetzky; next became chief of staff to Count Schlick; distinguished himself at Kaschan; obtained the Maria Theresa cross, and soon after was employed in diplomatic negotiations. In 1859 he distinguished himself in the battle of Solferino, and by his defense of Caoriana covered the retreat of the center; 1864, commanded the Sixth Army Corps against the Danes; as Governor of Holstein, made a favorable impression; 1866, commanded the Tenth Army Corps, and at Trautenau, on June 28th, gained the only advantage which the Austrians could boast of in that war. After the war he retired, and was chosen member for life of the Austrian Upper House, in which he belonged to the Liberal Party; 1867, commandant of Croatia and Sclavonia; 1869, general in command of Hungary.

Gaboriau (gä-bō-rē-ō'), **Émile**, 1835–73; French novelist, famous for his detective stories; b. Saujon; contributed to the Paris newspapers early in life; published his first story, "L'Affaire Lerouge," 1866, followed by "Le Dossier 113," 1867; "Le Crime d'Orcival," 1868; "Monsieur Lecoq," 1869; "Les Esclaves de Paris," 1869; "La Vie Infernale," 1870; "La Clique Dorée," 1871; and "La Corde au Cou," 1873; left MSS. of "L'Argent des Autres" and "La Dégringolade."

Ga'briel (Hebrew, "man of God," "mighty one of God"), the heavenly being who communicated prophetic tidings to Daniel (Dan. viii, 16; ix, 21), and later foretold the birth of St. John the Baptist and of Jesus (Luke i, 19, 26). Gabriel in Jewish, Christian, and Mohammedan traditions is one of the great archangels. In the Koran he is the special medium of communication between God and Mohammed, for he caused the Koran to descend on Mohammed's heart (*Koran*, Sura 2).

Gabriel, Saint, Or'der of (Roman Catholic), (1) a congregation of lay conventual brethren and of nonconventual gentlemen at Bologna, founded in 1638, engaged in work of instruction; (2) the Order of the Brothers of Saint Gabriel in France, founded in 1835 by the Abbé Deshayes; also engaged in instruction, chiefly in matters of doctrine, and especially in rural places.

Gabun (gä-bōn'), so-called river, but properly an estuary on the W. coast of Africa near the equator, extending 50 m. or more inland; width about 7 m.; receives two small rivers near its upper end. It has given its name to the adjacent coast.

Gad (Hebrew, "fortune"), seventh son of Jacob and elder son of Zilpah; founder of the tribe of Gad, one of the twelve tribes of Israel. The Gadites had permission to settle E. of the Jordan; became half nomads, and were carried away captive by Tiglath-pileser abt. 740 B.C.

Gad'ara, ancient city of Palestine, capital of Perræa, and one of the ten cities of the Decapolis. It was about 8 m. SE. of Lake Tiberias, and gave its name to Gadaritis, or the country of the Gadarenes. It was strongly fortified, and famous for its baths. Vespasian captured and burned it. It became the seat of a bishop, but was abandoned after the Mohammedan conquest. There are extensive ruins.

Gaddi (gäd'dē), celebrated family of Florentine painters. GADDO (1249–1312) was the reputed founder of modern mosaic art, and decorated the Basilica of Saint Peter and the Church of Santa Maria Maggiore in Rome. His son, TADDEO (1300–60), painted frescoes in the Church of Santa Croce, Florence, on New Testament subjects. "The Virgin Surrounded by Saints" is considered his masterpiece. He rebuilt the Ponte Vecchio and continued the Campanile of Santa Maria del Fiore after Giotto's death. His son, ANGELO (abt. 1324–87), has been considered the founder of the Venetian school of painting; his best works are the "Madonna," in the Church of St. Ambrose, and the fresco, "History of the True Cross," in the Church of Santa Croce, Florence.

Gade (gä'dĕ), **Niels Wilhelm,** 1817–90; Danish composer; b. Copenhagen; early excelled on the violin and pianoforte; produced "Echoes of Ossian," an overture, in 1841; and, after studies in Germany and Italy, a symphony in C minor. He succeeded Mendelssohn in 1844 as conductor of the Gewandhaus concerts at Leipzig, and, 1850, became royal chapelmaster in Copenhagen. His productions include symphonies, overtures, sonatas, quintets, romances; a lyrical drama, "Comala"; cantatas, "The Erl King's Daughter," "The Crusaders," "Zion," "Psyche"; and the "Nibelungen," an opera.

Gades (gā'dēz). See CADIZ.

Gad'fly, name applied to the breese or horsefly (*Tabanus bovinus*) and other dipterous insects of the *Tabanidæ*, the females of which goad or sting horses and cattle. Their bite is painful, but not poisonous. The name is also erroneously applied to botfly, and insects of the family *Œstridæ*.

Gad'idæ, family of fishes of commercial importance; includes the cod, haddock, hake, ling, rockling and cusk; sixty or seventy species have been described; family divided into the *Gadinæ*, *Phycinæ*, *Lotinæ*, *Gaidropsarinæ*, and *Brosminæ*. The species are chiefly confined to cold waters, and mostly to the N. hemisphere, but several genera are peculiar to the cool depths of tropical and subtropical seas, whence they reascend toward the surface in oceans of the S. hemisphere.

Gads'den, Christopher, 1724–1805; American statesman; b. Charleston, S. C. He was a delegate to the Stamp Act Congress, 1765, and to the first Continental Congress, 1774; became brigadier general, 1775; took part in the defense of Charleston, 1776; resigned, 1779; as lieutenant governor of the state, signed the capitulation when Charleston was taken by Sir Henry Clinton, 1780. Shortly after, in viola-

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among the Italian towns to form, after the Roman downfall, an independent communal government; was a republic in the time of Charlemagne; coined money, and was ruled by its own dukes, or doges, until 1230. It sustained many sieges during the Middle Ages; was the retreat of Pius IX, 1848–49; and was the only stronghold that made a spirited resistance to Victor Emmanuel's forces, 1860, in defense of Francis II, ex-King of Naples.

Gætu'lia, ancient name for W. part of the desert of Sahara. It was S. of Mauritania and Numidia, and inhabited by the Gætulians, supposed to have been the aboriginal Berbers. The Gætulians first came in contact with the Romans during the war with Jugurtha, in whose army they served as light cavalry. They were subdued by Lentulus.

Gage, Matilda Joslyn, 1826–98; American author; b. Cicero, N. Y.; early interested in woman suffrage, and held various offices in organizations to promote the movement; president of the Woman's National Liberal Union, 1893. She was editor of *The National Citizen*, 1878–81; an editor of the *History of Woman Suffrage*, 1881–86; author of "Woman's Rights Catechism," 1870; "Woman as an Inventor," 1871; "Woman, Church, and State," 1893.

Gage, Thomas, abt. 1596–1656; English missionary; b. probably in Surrey; sent to a Jesuit college in Spain, but disliked the order and joined the Dominicans. In 1625, started for the Philippine Islands with a party of missionaries; going by way of Mexico, he deserted the party there, and for twelve years was a missionary in Chiapas and Guatemala. In 1637, returned to Europe, and in 1641 renounced the Roman Catholic religion for the Protestant; joining the parliamentary party, became rector of Acrise, Kent, 1642, and, 1651, at Deal. In 1648 he published "English-American or New Survey of the West Indies," which attracted attention and led to privateering expeditions against the Spanish colonies.

Gage, Thomas, 1721–87; colonial governor; b. England; major general and Governor of Montreal, 1760; commander of the British forces in America, 1763; arrived in Boston to succeed Hutchinson as Governor of Massachusetts, 1774; seized the powder in Charlestown; began to fortify Boston; planned the expedition to Concord, which resulted in the battle of Lexington; declared martial law in Massachusetts, June 12, 1775; superseded by Gen. Howe, and returned to England, October, 1775.

Gail Ham'ilton. See DODGE, MARY ABIGAIL.

Gail'lard, Edwin Samuel, 1827–85; American physician; b. Charleston district, S. C.; went to Europe, 1857; settled in New York City; awarded the Fisk Fund prize for an essay on "Ozone," 1861; during the Civil War rose from assistant surgeon to medical director and inspector of hospitals in the Confederate service; established *The Richmond and Louisville Medical Journal*, 1866; Prof. Medical College of Virginia, 1867; removed to Louisville, Ky.; published his journal there; for nine years Prof. in the Louisville Medical College.

Gaillardet (gā-yär-dā'), **Théodore Frédéric,** 1808–82; French author and dramatic writer; b. Auxerre; became known through the drama, "La Tour du Nesle," performed in Paris, 1832, the authorship of which he claimed against Dumas *père*. After this he settled in New York, founded *Le Courrier des États-Unis*, of which he was Paris correspondent after his return to France, 1852. He published "Struensée, ou le Médecin de la Reine" and "Georges, ou le Criminel par Amour"; was also the author of the "Mémoires du Chevalier d'Eon" and of the "Professions de Foi et Considérations sur le Système Républicain des États-Unis."

Gaines, Edmund Pendleton, 1777–1849; American general; b. Culpeper Co., Va. At the battle of Chrystler's Field, November 11, 1813, rendered important services, and later successfully defended Fort Erie; made brevet major general, and received the thanks of Congress and a gold medal; afterwards engaged in the Creek and Seminole wars.

Gaines, Myra Clark, 1805–85; American claimant; b. New Orleans; daughter of Daniel Clark and wife of the preceding. Her father, supposedly a bachelor, died in New Orleans, August 16, 1813, and his estate was disposed of under the provisions of a will which gave the property to his mother. In 1832 Myra married W. W. Whitney, of New York. On the evidence of an old letter referring to a later will, and other evidence, suits were instituted for the recovery of the estate, and finally the lost or destroyed will was recognized by the Supreme Court of Louisiana (February 18, 1856) as the last will of Daniel Clark. In a suit in the U. S. Supreme Court she established her legitimacy. Mrs. Whitney survived her husband, married Gen. Gaines in 1839, and survived him also. In 1856 she sued in the U. S. Supreme Court to recover real estate in New Orleans, and a decision in her favor was rendered in 1867. The value of the property was estimated in 1861 at $35,000,000, of which Mrs. Gaines had up to 1874 received $6,000,000. Appeals and counter suits were in progress at the time of her death.

Gaines's Mill, locality in Virginia, about 8 m. NE. of Richmond; scene of an engagement in the Civil War in the Seven Days' Battles, and called also the battle of Gaines's Mill, of Cold Harbor, and of the Chickahominy. It was fought June 27, 1862, between the Fifth Corps of the Army of the Potomac, under Gen. Fitz-John Porter, reinforced by Meagher's and French's brigades, First Division, Second Corps, numbering about 35,000 men, and a Confederate force, under Gens. Longstreet, A. P. and D. H. Hill, Ewell, and Jackson, of about 60,000 men. The fighting was along the entire line, and the Confederates were everywhere repulsed. Union loss reported, 6,587; Confederate, 3,284. At night Porter moved his army across the Chickahominy toward McClellan's new base on the James, and burned the bridges behind him.

Gains'borough, Thomas, 1727–88; English painter; b. Sudbury, Suffolk; one of the original thirty-six Academicians, 1768, and from

then until 1784 sent pictures to the Academy. His portraits of members of the royal family and others gave him celebrity. As a landscape painter he achieved the highest excellence, and was the first in England to show real originality; has been called the father of modern landscape.

Gainsborough, town of Lincoln, England; on the Trent; 21 m. above its junction with the estuary of the Humber; has manufactures of linseed oil, and has an important transit trade between the interior and the North Sea, vessels of 200 tons being able to reach it; its old hall, used for exchange, assembly rooms, etc., is a curious structure, forming the three sides of a quadrangle, with a tower 75 ft. high; supposedly built by John of Gaunt. Pop. (1901) 17,660.

Gaisford (gāz'fōrd), **Thomas,** 1779–1855; English Hellenist; b. Ifort, Wilt; took orders in the Church, but devoted himself to classical learning; Prof. of Greek, Oxford, 1811; dean of Christ Church, 1831; and curator of the Bodleian Library, 1847. He was regarded, after the death of Porson, as the best representative of English scholarship, and he was consulted about the MS. treasures in England. His literary activity was great, and began early.

Gaits, various peculiar combinations of movements of the legs and bodies of certain animals, due to differences in the associations of the legs, or to the special characters and relations of their movements, or to both. In bipeds, as man, there are only three gaits—the walk, the run, and the jump. In quadrupeds the number is increased, owing to the greater number of legs and the possible variations in their associated movements. The labor of propulsion is accomplished almost solely by the hind legs, the fore legs doing but little more than affording support. In all except the walk, the feet are entirely off the ground for variable intervals. The legs are always paired in their actions, the combinations sometimes being lateral, at others diagonal, and at others opposite. In some instances there is a constant shifting from the lateral to the diagonal, and *vice versa.* In spite of a dual association in the movements of the legs, no two feet are raised from, or touch, the ground at precisely the same time, although the intervals in some instances are exceedingly small.

The chief distinguishing features of the various gaits of horses are as follows: In the walk the legs are paired diagonally and laterally alternately during each act; the body is supported by two or three feet, never by one, nor is it ever without support, as in the amble, trot, canter, gallop, and run; four hoof sounds are heard, but at irregular intervals. In the amble the pairing is constantly lateral, the two left and the two hind legs respectively forming the couples; the pairs move forward and backward together; the feet of each pair strike the ground almost simultaneously, so that but two sounds are heard. In the trot the pairing is constantly diagonal, and they move forward and backward in the same relationship as in the amble, producing, sim-

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Gaius (gā'yŭs), in the New Testament, the name of apparently three persons associated with St. Paul's preaching, though it may have been confined to one or two persons only, *viz.*: a Macedonian who accompanied St. Paul in his travels, and whose life was in danger at Ephesus; a Corinthian convert who entertained the apostle while preaching in Corinth; and one who accompanied him from Corinth on his last journey to Jerusalem. The "well-beloved Gaius," to whom St. Paul addressed his third epistle, is believed to have been the Corinthian convert.

Ga'ius, or **Ca'ius**, Roman jurist of the second century A.D.; author of more than fifteen works, of which the "Institutes" was the most important. This is supposed to have been the first popular text-book of Roman law. It was incorporated almost bodily into Justinian's "Institutes." The work was lost, but a large part was recovered, 1816–17, from a much defaced palimpsest found by Niebuhr in the Cathedral Library at Verona.

Galabat', a district and town on the frontier between Egypt and Abyssinia; was down to 1873 the center of the Egyptian slave trade, and is still a great entrepôt between Egypt and Abyssinia. The town and the district were originally peopled by Tokruris from Darfur. It is now under Italian control.

Galac'tic Cir'cle, the great circle of the heavens, coinciding with the course of the Galaxy, or Milky Way.

Galactom'eter. See LACTOMETER.

Gal'ahad, Sir. See SANGREAL.

Galan'this, in Greek mythology, a servant-maid of Alcmene. Her sagacity saved her mistress great pain at the birth of Hercules, and defeated the plots of Juno. She was changed by Lucina into a weasel, and condemned to bring forth her young by the mouth, in great suffering.

Galapagos (gă-lăp'ă-gōs) **Is'lands** ("Tortoise Islands"); group of thirteen small islands of volcanic origin in the Pacific, on the equator, and between longitude 89° and 92° W.; total area, about 2,400 sq. m. The Ecuadorians planted a penal colony here, 1832, in an endeavor to people the group, but the population is now confined to a few fishermen, turtle hunters, and wreckers, mainly on Chatham Island. The islands are noticeable on account of the many large land turtles. The flora and fauna of the group are peculiar and interesting.

Galate'a, or **Galathæ'a**, in Greek mythology, a sea nymph, daughter of Nereus and Doris. She was passionately loved by the Cyclop Polyphemus, whom she treated with disdain, while Acis, a young shepherd of Sicily, enjoyed her affection. The happiness of the lovers was disturbed by the Cyclop, who crushed his rival to atoms with a piece of rock. Galatea was inconsolable, and, as she could not restore him to life, changed him into a fountain. The love of Polyphemus was a favorite subject with the Greek and Latin poets.

Gala'tia, ancient province of Asia Minor, E. of Phrygia, of which it once formed part. The Halys traversed it from N. to S. It was called Gallo-Grecia, or Galatia, from the Gauls, who conquered it and settled in it in the latter part of the third century B.C. The inhabitants retained the Gallic language up to the fourth century A.D. It was governed by tetrarchs, one of whom, Deiotarus, was made king by the Romans for his services against Mithridates, receiving also Pontus and Armenia Minor. On the death of his successor, Amyntas, the country was annexed to the Roman Empire, 25 B.C. Paul first preached and organized churches in Galatia. The country is the home of the Angora goat, which produces mohair.

Gala'tians, Epis'tle of St. Paul to the, a book of the New Testament written—some say from Ephesus in 55 or 56 A.D., but probably from Corinth in 57 or 58—to the disciples in Galatia, where Paul had founded churches. The epistle is addressed not to a particular church or individual, but to the churches of a district. The occasion of the epistle was the attempt to impose Jewish laws on Paul's converts. He discusses the relations of Christianity to Judaism, and his treatment of the question shows the influence of his rabbinical education. This is, next to the Romans, doctrinally the most important of his epistles.

Galatz (gă'lăts), city of Roumania; on the Danube; here navigable for vessels of 300 tons; 85 m. above the Sulina mouth. It is the great center of trade between Vienna and Constantinople, exporting grain, wine, wool, and timber, and importing cloth, cotton, and silk goods, ironware, leather, and tobacco. It is the seat of the European Danube Commission and of a bishopric; has often been taken in the wars between the Russians and Turks since 1789. It ceased to be a free port in 1883. Pop. (1907) 62,545.

Gal'axy, or **Milk'y Way**, an irregular band of light visible in the heavens on a clear night. Its course is nearly that of a great circle inclined at an angle of 63° to the equator, and cutting that circle in two points, whose right ascensions are respectively 0h. 47m. and 12h. 47m. The most condensed stratum does not, however, lie exactly in one plane, but in two different ones, inclined at an angle of about 10°; but the great circle to which it so nearly conforms was called by Sir John Herschel the galactic circle. At several points it throws off streams or branches, as in Perseus, and also in Argo, where it opens out into a fanlike expansion nearly 20° in breadth. At Sagittarii there is an oval mass of 4° by 6° containing upward of 100,000 stars. Spaces often occur in its course, entirely devoid of stars and perfectly black, the most remarkable one being in the Southern Cross, and called by navigators the "coal sack."

The ancients held a variety of opinions concerning the milky way. Aristotle regarded it as constituted of the same substance as comets, but Democritus formed the opinion that the milky way consists of a multitude of stars. It was not until the invention of the telescope

that its nature could be demonstrated. Galileo with his small telescope resolved it in many places into stars, but the Herschels gave the first definite ideas of its constitution. Struve thought that the distribution of the stars in the medial plan of the milky way is illimitable; but the younger Herschel's reasoning from the existence of the black ground on which the milky way is projected controverts this hypothesis. Sir William Herschel drew the conclusion that the galaxy is composed of a stratum of stars, of which the thickness is inconsiderable in comparison with its length and breadth, and that the sun is placed not far from the middle of the stratum, somewhat nearer to its N. than to its S. surface. Later researches have led to the inference that the structure of the galaxy is a complicated spiral, with outlying branches extending beyond the range of the most powerful telescopes. Prof. Simon Newcomb is of the opinion that the true constitution of the galaxy is still one of the unsolved problems of astronomy, and that probably it is a vast irregular ring of star clusters, near the center of which the sun is situated; but no certain data exist for fixing the position of this ring among the other stars, and means of measuring the distances of the stars are too imperfect to enable such data to be collected.

Gal'ba, Servius Sulpicius, 3 B.C.–69 A.D.; Roman emperor; b. near Terracina; adopted by his stepmother, a relative of the wife of Augustus; prætor, 20 A.D.; consul in 33; commanded with distinction in Gaul, 39–41; in Africa, 45–46, and attained great honors at Rome; held command in Spain, 61–68; saluted emperor by his men, and went to Rome, where he succeeded Nero in 68, but his avarice and cruelty rendered him unpopular, and he was murdered by the prætorians; was the first emperor not of Augustan family; succeeded by Otho.

Gal'banum, one of the fetid gums; a gum resin brought from the Levant, India, and Persia; is the concrete juice of some umbelliferous plant, probably a *Ferula*. It is antispasmodic, expectorant, and stimulant, and is used as an ingredient of plasters.

Gal'dós, Benito Perez, 1845– ; Spanish novelist; b. Las Palmas, Canary Islands; after writing plays that were unsuccessful, took up novel writing; works include "The Fountain of Gold," "The Family of Léon Roch," "The Unknown," "Halma."

Gale, Sweet Gale, or **Dutch Myr'tle,** a plant of the genus *Myrica*; a fragrant European and N. American shrub, growing in cold, wet lands; abounds in an essential oil. It has been used in cases of the itch, and will keep away moths and other insect vermin; hence the Scotch Highlanders make beds of the twigs, which are also used instead of hops in home-brewed beer. A decoction of the fresh leaves is considered effective against bugs. A yellow essential oil is distilled from the leaves. The genus also includes the bayberry and sweet fern.

Gale, Theophilus, 1628–78; English theologian; b. Devon; was a popular preacher in Winchester; ejected for nonconformity at the Restoration; became pastor at Holborn afterwards taught at Newington. He left property for the education of dissenting students, and bequeathed his library to Harvard. His chief work, "The Court of the Gentiles," a Discourse Touching the Original of Human Literature."

Ga'len, Christoph Bernhard von, abt. 1600–78; German prelate; b. Bispuik, Westphalia; Bishop of Münster, 1650; restored discipline, expelled the foreign invaders, and put down an insurrection of the city of Münster, 1661. He joined the war against the Turks, 1664, and gained great renown; then fought the Dutch Republic for having aided Münster, but peace was made, 1666; joined France against the Dutch, 1672, but was defeated at Coevorden. In 1675 he sided with the emperor against France, and with Denmark and Brandenburg against Sweden; captured Stade, the capital of Bremen. He now increased his military forces, and, 1677, sent 9,000 men against France and 5,000 against Sweden. He took part in the peace of Nimeguen.

Galen, or **Gale'nus, Claudius,** 130–abt. 200 A.D.; Greek physician; b. Pergamus; traveled many years to increase his knowledge, and spent four years in Rome, where he acquired a great reputation; attended the emperors, Marcus Aurelius and Verus; added to his fame by lectures and writings. He was a voluminous writer on medicine and philosophy; and for more than 1,000 years after his death his authority in medical matters was supreme. Eighty-three of his treatises are extant, and fifteen commentaries on Hippocrates.

Gale'na, capital of Jo Daviess Co., Ill.; on the Galena River, 5 m. from its junction with the Mississippi, and 180 m. WNW. of Chicago; is built on bluffs above the river, which by a lockage system, constructed 1891, is navigable by the largest steamboats. The city is named from the mines of galena, which abound in the vicinity. Galena is the business center of the seventy-two lead-producing townships in Wisconsin and Illinois, which cover 1,000,000 acres of land, mostly very fertile. The city has water power, pork-packing interests, manufactures of woolens, furniture, castings, lumber, axle grease, hot-water heaters, flour, and smelting works. In the public park is a bronze statue of Gen. U. S. Grant, who at one time lived in Galena. Pop. (1900) 5,005.

Galena, sulphide of lead, the ore which furnishes most of the lead of commerce; occurs in crystalline and also in granular and fibrous masses; has the luster of polished steel, which changes by exposure to a dull lead gray. Its hardness is from 2.5 to 2.75; sp. gr., 7.25 to 7.7; symbol, PbS; composed of lead, 86.6; sulphur, 13.4; but it often contains other metals, as antimony, silver, zinc, iron, and copper, as well as selenium. In the U. S. galena is of frequent occurrence in the veins contained in the crystalline rocks of the Alleghany belt of New England, the Adirondacks, and Canada. It is also found in the Silurian rocks of the Shawangunk Mountains, at Rossie, N. Y., at

Lexington, Ky., where it occurs in fissure veins, and in the lead regions of the upper Mississippi and S. Missouri, where it fills or lines crevices called *gash veins* in the carboniferous and lower Silurian limestones. Galena is met with throughout most of the Rocky Mountain silver-mining districts.

Galeopithecus (gā-lē-ō-pĭ-thē'kŭs). See FLYING LEMURS.

Gale'rius, Caius Valerius Maximianus, a Roman emperor; reigned 305–11 A.D.; was the son of a Dacian peasant; distinguished by his courage; was appointed Cæsar, 292, by Diocletian, whose daughter he married, and received the government of Thrace and Macedonia. After the abdication of Diocletian, 305, he reigned over the East as Maximianus II. When Italy recognized Maxentius, he marched to besiege Rome, but was defeated by Maxentius, 307.

Gales, Joseph, abt. 1760–1841; American journalist; b. England; was a printer, bookseller, and journalist of Sheffield; gave offense by his republicanism, and, 1793, emigrated to Philadelphia. Conducted the *Independent Gazetteer,* and introduced shorthand reports of the debates in Congress; 1799, established the Raleigh, N. C., *Register,* which he conducted for nearly forty years.

Gales'burg, capital of Knox Co., Ill.; 53 m. NW. of Peoria; in a rich agricultural region; has important manufactures, and is the center of a large trade; contains the shops and stockyards of the Chicago, Burlington and Quincy Railroad; brick yards, agricultural implement works, carriage and wagon factory, etc. The city is the seat of Lombard Univ. (Universalist), Knox College (nonsectarian), and St. Joseph's Academy (Roman Catholic); Galesburg Kindergarten Normal School, Knox Conservatory of Music, Corpus Christi Lyceum, etc. Pop. (1900) 18,607.

Galia'ni, Ferdinando, 1728–87; Italian political economist; b. Chieti; educated for the Church, but devoted himself to archæology, letters, history, and political and commercial science; published, 1750, his great work, "Money"; resided, 1759–69, in France, and published shortly after his return to Naples his "Dialogues on the Trade in Corn"; councilor to the Neapolitan Board of Trade, 1769; its secretary, 1770; Finance Minister, 1782.

Galicia (gă-lĭsh'ĭ-ă), a former province of Spain, originally a separate kingdom, comprising the NW. part of the peninsula; bounded S. by Portugal and N. and W. by the Atlantic; divided into four provinces, Corunna, Lugo, Orense, and Pontevedra, 1833. The principal towns are Santiago di Compostella and the two strongly fortified seaports, Coruña and Ferrol. Galicia was a kingdom under the Suevi from 411 to 585, and again from 1060 to 1071, at which date it was incorporated with Leon and Castile. The inhabitants are known as Gallegos. In language they are more closely allied to the Portuguese than to the Spanish.

Galicia, province of Austria, consisting of the old territories of Galicia, Lodomeria, Auschwitz, Zator, and Cracow, and divided into two governmental districts, Lemberg and Cracow; bounded S. by Hungary; E. and W. by Russia and Poland. The earliest regular settlement of Galicia was by the Ruthenians, who now occupy the E. division (E. of the San), also called Red Russia. The territory was subject to different powers, and various principalities were formed in it, the chief of which was Halicz, from which the present name is derived. It belonged to Poland from 1340 till the time of the first partition, 1772, when it was taken by the Empress Maria Theresa, on the grounds of the old claims of the crown of Hungary. Polish is now the dominant element, but strongly opposed by the Ruthenian. Pop. (1900) 7,315,939.

Galignani (gă-lēn-yä'nē), **John Anthony,** 1796–1873; French publisher; b. London; son of an Italian, who, removing to Paris, founded a monthly, which became a weekly paper, and, 1814, *Galignani's Messenger,* which did much to promote cordiality between France and England. After his death, 1821, John and his brother William (1798–1882) continued the business, and issued reprints of English books, as well as the *Messenger.* They built a hospital at Corbeil, near Paris, for indigent Englishmen, and a home for indigent printers, booksellers, etc., at Neuilly.

Gal'ilee, northernmost of the three W. main divisions of Palestine in the time of the Romans, subdivided into Upper and Lower Galilee; was bounded N. and W. by Mount Lebanon, Cœle-Syria, Phœnicia, and the Mediterranean, E. by the Jordan and Lake of Tiberias or Gennesaret, and S. by Samaria; embraced the ancient territories of Naphtali, Zebulon, and Asher, and parts of Issachar. The upper or N. division was called Galilee of the Nations or Gentiles. The inhabitants were of mixed blood, spoke a corrupt dialect, and were of a turbulent spirit. It contained Nazareth, Cana, and Capernaum. The apostles were all Galileans by birth or residence.

Galilee, Sea of. See GENNESARET, LAKE OF.

Galilee, in certain ancient churches, a chapel, sometimes the entrance chapel or porch, or, in other cases, a portion of the church whose floor was depressed one step below the rest. In the galilee monks assembled to receive visits from their female relatives, for it was considered less sacred than the rest of the building. The term is also applied to an unusual projecting or partly separated structure in the Cathedral of Peterborough, one in the Church of St. Mary at Melton Mowbray, and one at Lincoln; in modern usage it has no very exact meaning, and is given by local tradition.

Galilei (gă-lĭ-lā'ē), **Galileo,** commonly called GALILEO, 1564–1642; Italian philosopher and astronomer; b. Pisa, of a noble Florentine family. He received a fair education; resolved to be a painter, and his love of drawing led him to the study of geometry. Abt. 1583 he discovered the isochronism of the vibration of the pendulum by noticing the swinging of a lamp. In 1589 he became Prof. of Mathematics at Pisa;

demonstrated the fallacy of the theory that the velocity of falling bodies is proportional to their weight, by letting fall unequal weights from the top of the leaning tower. From 1592–1610 was Prof. of Mathematics, Univ. of Padua, and soon afterwards he became a convert to the Copernican theory. In 1609, made his first telescope, whereupon the Venetian Senate confirmed him in his professorship for life. He published an account of his wonderful discoveries with this instrument, 1610, in his "Sidereal Messenger," which secured him the enmity of the astronomers of the old school. Abt. 1611 he removed to Florence, where the grand duke made him his philosopher and mathematician, with a liberal salary and nominal duties. In 1612 he combated the common opinion that the tendency of substances to sink or swim in water depends on their shape. The malice of his enemies now began to acquire a dangerous intensity. In 1616 he was summoned before the Inquisition in Rome, charged with interpreting the Scriptures to suit his own theory, and forbidden ever again to teach the motion of the earth and the stability of the sun. In 1632 he published his "Dialogue on the Two Principal Systems of the World, the Ptolemaic and Copernican," in which he summed up the arguments for and against his theory. This being regarded as a violation of the injunction, Galileo was summoned to Rome, tried 1633, required to abjure his errors and heresies, and condemned to be imprisoned at the Inquisition during pleasure, and to recite once a week for three years the seven penitential psalms. He was released after four days' confinement, but for the rest of his life was under surveillance. He seems now to have employed himself in other branches of natural philosophy, and his book of "Dialogues on Local Motion," completed 1636, was printed at Amsterdam, 1638. In 1636 he discovered the moon's diurnal libration. In 1637 a disease which had impaired his right eye for some years attacked the left also, and in a few months be became blind. Almost complete deafness afterwards came upon him, and he died while preparing for a continuation of his "Dialogues on Motion."

Gal'ingale, various plants, especially certain sedges of the genus *Cyperus,* and more particularly *C. longus,* a bulbous sedge of Europe. Its bulbs have been employed in medicine, but are more used by perfumers, who extract from them a substance having a fragrance like violets. Other species, especially those found in tropical lands, yield perfumes.

Gal'ipot, concrete turpentine which collects on pine trees in the S. of France; called also *barras*; is an article of commerce, and after it is melted and strained enters into some pharmaceutical compounds in European practice.

Gall, Franz Joseph, 1758–1828; founder of phrenology; b. Tiefenbronn, Baden, Germany. From childhood noticed and extensively compared the differences in the shapes of men's heads, believing that these differences would afford the best index to the mental and moral characters of persons examined. In 1796 he

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are partly Mohammedan, while the majority are pagans; remarkable for their bravery and savage character, and are dark brown, and have frizzled hair.

Gal'latin, Albert, 1761–1849; American statesman; b. Geneva, Switzerland; graduated at Univ. of Geneva, 1779; came to the U. S., 1780; enlisted in the Continental army, and was given command of the fort at Passamaquoddy, Me. In 1783, taught French in Harvard; in 1786, settled in Fayette Co., Pa.; 1789, was a member of the convention to revise the state constitution, and in 1790–91 was a member of the legislature. In 1793 he was elected to the U. S. Senate, but was declared ineligible. In the "whisky insurrection" of 1794 his mediation secured a peaceful settlement. From 1795 to 1801 he was a member of Congress, where he became the leader of the Republican Party. From 1801 to 1813 he was Secretary of the Treasury, and attained a high reputation as a financier. In 1813 he was appointed to negotiate with Great Britain under the mediation of Russia, and went to St. Petersburg; but the Senate refused to confirm the appointment because it was incompatible with his secretaryship. He was one of the commissioners who negotiated the treaty of peace with England at Ghent, 1814, and assisted in concluding the commercial convention in London, 1815; 1815 to 1823, Minister to France. On his return he refused a seat in the Cabinet, and declined to be a candidate for Vice President, for which office he had been nominated by the Democratic Party. In 1826–27 he was Envoy Extraordinary to England, and afterwards resided in New York. He was chosen president of the Council of the Univ. of New York, 1830; president of the National Bank, 1831–39, and of the New York Historical Society from 1843 till his death. Besides important pamphlets on financial and political subjects, he published "Considerations on the Currency and Banking System of the United States," "Synopsis of the Indian Tribes within the United States," "Semicivilized Nations of Mexico, Yucatan, and Central America," and "Vocabularies of North America."

Gallatin, Mount, mountain some 10,000 ft. high; near the NW. corner of Wyoming, and in the National Park. Near its base rise the Gallatin River and the E. fork of the Madison.

Gallatin Riv'er, one of the head streams of the Missouri; rises in Montana, near the National Park; general course is N. through one of the most beautiful, healthful, and fertile parts of Montana; length, 125 m.

Gallaudet (găl-â-dĕt'), **Thomas Hopkins,** 1787–1851; founder of the first institution in American for instruction of the deaf and dumb; b. Philadelphia; licensed to preach, 1814, but soon superintended the establishment of an institution for the instruction of the deaf and dumb at Hartford, Conn. After examining the institutions of Europe, he opened the Hartford asylum, 1817; resigned his post as principal, 1830, but continued to be a director; from 1838 till his death was chaplain of the Connecticut Retreat for the Insane at Hartford; published "The Child's Book of the Soul," "The Youth's Book of Natural Theology," and other works, and edited six volumes of the "Annals of the Deaf and Dumb."

Gall Blad'der, pear-shaped membranous reservoir of the bile, in a slight depression on the lower surface of the right lobe of the liver. The gall bladder receives through the cystic and hepatic ducts the bile secreted by the liver, and discharges its contents through the common bile duct into the upper portion of the small intestine. A thick mucus secreted by the lining of the gall bladder may obstruct the bile duct, causing biliousness, or even plug it and produce jaundice.

Galle (găl), or **Point de Galle,** town of Ceylon, on the SW. coast of the island; is fortified, well built, and has a good harbor. Its trade is insignificant, notwithstanding the fertility of the surrounding districts and the commercial advantages of its position. Pop. (1901) 34,000. See CEYLON.

Galle (găl'ĕh), **Johann Gottfried,** 1812– ; German astronomer; b. Pabsthaus; astronomical assistant in the Berlin Observatory, under Encke; discovered three comets, 1839–40. In 1846, following directions sent him by Leverrier, he found the planet Neptune, the discovery occurring on the evening of the very day (September 23d) on which the directions were received. In 1851 he became Prof. of Astronomy at Breslau; twice received the Lalande prize; prolific author on climatology and astronomy.

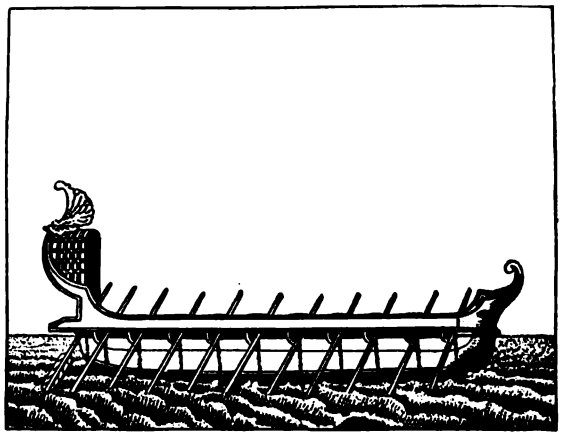
Galleass (găl'lē-ăs), a sort of three-masted galley formerly built in Spain and Italy. There were enormous towering structures at either end. As many as 300 galley slaves were employed in rowing one of these vessels. They were much larger than the galleys, and (unlike them) had guns in broadside.

Gal'leon, class of large ships formerly built in Spain. Some galleons were used in war, and had four gun decks. Others were employed as treasure ships in bringing precious metals from America to Spain. They were large, clumsy structures, and were the easy prey of pirates and hostile navies. Their bulwarks were 3 or 4 ft. thick.

Gal'lery, originally a room long in proportion to its width. As such rooms, which were frequent in large English country houses, were used for the family portraits, often numerous and important, and for other works of art, the term *gallery* has come to be used for rooms of whatever shape meant for the exhibition of paintings, sculptures, etc. The term is also used for long and narrow uninclosed or half-inclosed parts of buildings, and especially for a partial upper floor in a church or a theater, built in projection like a balcony from the inner face of the wall of the room, and supported by brackets or pillars.

Gal'ley, long, narrow ship, propelled partly by sails, but chiefly by oars, and used both in war and in commerce. Such ships were built by the Phœnicians, Carthaginians, Greeks, and

the seventeenth century; indeed, small boats of similar model are still to be found. The oars of the old-time galleys were in one or more



ROMAN SEA-GOING GALLEY.

banks or tiers, and often were worked by convicts or by slaves, who were sometimes chained to them. The swift piratical galleys of Barbary were rowed by Christian slaves. GALLEY, in printing, is the tray upon which type is deposited after being set and before being made up into page form.

Galli (găl'ī), the name borne at Pessinus in Phrygia (Asia Minor) by the self-mutilated priests of the great Asiatic goddess who was known in Phrygia as Cybele-Agdistis, though she was worshiped in different countries under different names. Her religion was an impure worship of the procreative powers of nature; her priestesses devoted themselves to wickedness in the name of religion.

Gal'lia, commonly Anglicized as GAUL, name given by the Romans to the regions inhabited by Celts in Italy, and what is now France. When the Greeks first became acquainted with SW. Europe, they called it Celtice, and the inhabitants Celts. Afterwards arose the designations, Galatia-Galati and Gallia-Galli, and the latter—the shortest one, nearly syonymous with Celtice-Celts—was adopted by the Romans. Celtic Italy was called Cisalpine Gaul, and that part N. of the Po was Transpadane Gaul; while what is now France was Transalpine Gaul, Gallia Ulterior; also Gallia Comata, or "long-haired Gaul," from the length of the hair worn by the inhabitants. Gallia Braccata, "breeched Gaul" (from the use of breeches as clothing), was also called Gallia Narbonensis, and was a strip along the Mediterranean coast of France.

CISALPINE GAUL, in a general way, may be defined as that part of Gaul which was between the summits of the Alps on the N. and the Trebia and the Rubicon on the S. Traces of a Celtic language exist in the names of places still farther S., and Celts must early have had under the Romans.

TRANSALPINE GAUL, the Gallia of Cæsar, was divided in his time into Aquitania, which lay SW. of the Garonne, whose people were probably of Basque race; Gallia proper, or the region of the Celtæ or Galli, extending from the Garonne to the Saône and Marne; and Gallia Belgica, bounded E. by the Rhine. It has been conceived that the Belgæ were Gauls (Celts) of the Cymric branch, but the point has never been established; and it is certain that a large Germanic element existed there. Julius Cæsar and his successors adopted, with success, the policy of Romanizing Gaul, and in later times, chiefly under Frankish influence, it became Germanized, and most of its Celtic traits disappeared.

Gal'lic Ac'id ($C_7H_6O_5 = H_3C_7H_3O_5$), acid found in most astringent parts of plants associated with tannic acid; obtained in slender, silky needles or crystals. When pure, these are colorless, without odor, sour, and astringent. They are soluble in 100 parts of cold or three parts of boiling water, very soluble in alcohol, less so in ether. When gallic acid is heated to 410° F. it is volatilized and converted into pyrogallic acid and carbonic anhydride. When swallowed, gallic acid is rapidly absorbed from the stomach into the blood, and remains in the blood unchanged. Medicinally, gallic acid is used as an astringent, especially for internal use, as tannic acid, though more powerful, is rendered insoluble by gelatin, while gallic acid is not. Used to check hemorrhage from the chest, uterus, etc.

Gal'licanism, a movement within the Roman Catholic Church in France which aimed at vindication of the national position of French Church against the encroachments the papal court. The question was one of stitution and administration only, not trines and dogmas; and the liberty wh desired was not a schism or the estab of an independent Gallican Church, b a limitation of the papal authority of the episcopal. The Vatican Cour gave the deathblow to Gallicanism Catholicism. Bishop Dupanloup was the last distinguished Galli voted against papal infallibili wards submitted to the Counci

Gallie'nus, Publius Licinius tius, d. 268; Roman emper cessor of Valerian; raised t father, 253, and, 260, be His reign was disturbed mans, Franks, Goths, and others; a dire pe people, and the so-calle anarchy throughout th by his own soldiers the fiftieth year of

Gallinæ (găl-lī'nē), order of birds embracing the fowls in the widest acceptation of the term, the equivalent of the old term *Rasores*, less the pigeons, and synonymous with *Gallinaceæ*. The *Gallinæ* are birds with stout legs and feet; short, strong claws, small heads, curved bills, and short, rounded wings. The species lay numerous eggs, the young are clothed with down and run about as soon as hatched; they include the mound builders, curassows, grouse, pheasants, turkeys, and all related forms.

Gall In'sects, a name for several hymenopterous insects of the family *Cynipidæ*, which form upon plants the morbid products known as galls, each species seeming to be addicted to a particular plant and a particular part of the plant. The tumor, or gall, is due to the morbid action of an irritating fluid deposited with the egg of the insect. Three kinds of gall insects are often reared in one gall: the true gallfly which causes the gall, the guests which lay their eggs in the galls caused by the true gallfly, and the parasites which prey upon both of these insects. The large galls at the base of oak leaves are produced by the *Cynips quercus bacoarum*, a fly of a brown color, with black antennæ, chestnut-brown legs, and white wings. The small galls on the under surface of oak leaves are due to another species, *C. quercus folii*; those on the stems of oaks to *C. terminalis*. The shrubby oak (*Q. infectoria*) of Syria is attacked by *C. gallæ tinctoriæ*, which gives rise to the hard gall, or gall nut, which is chiefly used in commerce. The hairy gall of the rose, called a *Bedeguar*, is also the work of a species of *Cynips*. The larvæ in this, as in the oak gall, do not come out till the following spring. Other familiar species of gall insects are the plant lice, gall weevils, and mite galls.

Gal'linule, name for various birds closely related to the rails. The common species of the U. S. is the Florida gallinule, or mud hen, a bird about a foot long; is widely distributed, inhabiting marshes and the reedy borders of streams and ponds. The purple gallinule is a much smaller bird, of a rich-blue color; a resident of Central and S. America and the W. Indies; found also in the S. U. S., and straggling N. to New England.

Gal'lio, proconsul of Achaia; elder brother of Seneca the philosopher; adopted by Junius Gallio, a rhetorician. According to Eusebius, he committed suicide, 65 A.D.

Gallipoli (găl-lĭp'ō-lĭ), small, fortified, maritime town of Italy; province of Lecce; 59 m. S. of Brindisi; is on a high rock, formerly a promontory, but now entirely surrounded by the Ionian Sea, and only connected with the mainland by a bridge. Gallipoli exports olive oil, which is stored in great tanks cut in the solid rock, and has some manufactures. Pop. (1901) 13,552.

Gallipoli, city of European Turkey; province of Roumili; at the NE. end of the Dardanelles, and 110 m. WSW. of Constantinople. It has two good harbors, manufactures of earthenware and morocco leather, and an extensive trade. Gallipoli is the key to Constantinople and the Black Sea. Pop. abt. 30,000.

Gallipoli, Penin'sula of, tongue of land separating the Hellespont from the Ægean Sea and the Gulf of Saros, 62 m. long, by a varying breadth of from 4 to 12 m.

Gallipoli Oil, coarse oil used in Turkey-red dyeing, etc.; prepared from olives grown in Calabria and Apulia, the latter being considered the best; conveyed in skins to Gallipoli, where it is clarified and shipped in casks.

Gallisonnière (gă-lē-sō-nĭ-ār'), **Augustin Félix Elisabeth Barrin** (Count de la), 1742–1828; French military officer; b. Anjou. He entered the army, serving against Hanover; made *maréchal de camp*, 1788, and grand seneschal of the sword for Anjou, 1789, by virtue of which office he was president of the nobles in the States-General, 1789; presided over the assembled Three Estates at the beginning of the Revolution, and was premier deputy of the nobles in the Constituent Assembly; was in public life under Napoleon. When the Bourbons returned, was lieutenant general, but retired, 1815.

Gallisonnière, Roland Michel Barrin (Marquis de la), 1693–1756; French naval officer; b. Rochefort; entered the French navy, 1710; while captain was, 1747–49, Governor General of Canada, where he displayed great energy in naval construction and in establishing forts between Canada and Louisiana. Gallisonnière next was Chief of the Bureau of Maps and Charts, with the rank of *chef d'escadre*; in 1756 he defeated Byng off Minorca.

Gallitzin (gă-lēt'zēn), a Russian princely house whose origin is Lithuanian, the Prince Gedemin, the ancestor of the Jagellon princes, being also ancestor of the Gallitzins. The name comes from *Golitza* (leather gauntlet), a surname of Mikhail Ivanovitch Bulgak, one of the ancestors of the family, distinguished as the wearer of gloves of this kind. Ivan the Terrible in the sixteenth century made one of the family a boyar, and since that time there have been many diplomatists, generals, and politicians among the princes.

Gal'lium, a chemical element discovered, in 1875, in a zinc blende, by Lecoq de Boisbaudran, by means of the spectroscope, as gallium gives a brilliant violet line in the spectrum. It owes its name to the Latin name of France, *Gallia*. Its properties were foretold by Mendeléeff some years before it was discovered, and it was described by him under the name ekaaluminium. Gallium resembles aluminium in the composition and character of its compounds. Since its discovery it has been found in a number of zinc blendes, but in largest quantity in those at Bensberg, on the Rhine, at Asturia, and at Pierrefitte. The metal forms two oxides and two chlorides; atomic weight, 69.9; symbol, Ga.

Gal'lon, old English measure of capacity, subdivided into four quarts, or eight pints, or

articles. The wine gallon, called also the standard gallon, contained 231 cu. in., the ale gallon 282 cu. in., and the corn gallon 268.8 cu. in. The imperial gallon was established by the British Parliament, January 1, 1826; its capacity was 10 lbs. avoirdupois of distilled water, that weighed 252.458 grains to the cubic inch, thus making its contents 277.274 cu. in. = 4.54346 liters. The gallon of the U. S. is the English wine gallon of 231 cu. in., and contains 8.3388822 avoirdupois lbs., or 58,372.1754 troy grains of distilled water at 39.83° F., the barometer being at 30 in. It is equal to 3.785207 liters.

Gallotan'nic Ac'id, the variety of tannic acid or tannin which is found in the gall nuts of *Quercus infectoria* and other oaks, in sumac, and in Chinese gall nuts. It differs from caffetannic, catechutannic, morintannic, quercitannic, and quinotannic acids in certain important properties, although it resembles them in possessing a rough, astringent taste, coloring ferric salts blue-black or green, precipitating albumen and gelatin, and converting animal membranes into leather.

Gal'loway, Joseph, abt. 1729–1803; American lawyer; b. near West River, Md.; began practice in Philadelphia, and became a member of the Pennsylvania Assembly, 1764, and a delegate to the first Congress, 1774. Having abandoned the Whigs, he remained with the British army in Philadelphia and New Jersey till 1778, after which he lived in England. His literary remains comprise "Candid Examination of the Mutual Claims of Great Britain and the Colonies," 1775; "Letters to a Nobleman," 1779, and "Reply to Sir William Howe," 1780.

Gall, St. See ST. GAUL.

Gall Stones. See CALCULUS.

Gallup'pi, Pasquale, 1770–1846; Italian philosopher; b. Tropea, Calabria; in 1819, published the first two of his six volumes entitled "Saggio Filosofico sulla Critica della Conoscenza." In 1821 appeared his "Elementi della Filosofia ad uso dei giovinetti." His greatest work, "Lettere sulle Vicende della Filosofia Relativamente ai Principii delle Conoscenze Umane da Cartesio Fino a Kant Inclusivamente," was published, 1827; 1831, Prof. of Logic and Metaphysics, Univ. of Naples, and, 1832, published the first two volumes of his "Filosofia della Volontà." He was the first among the modern philosophers of Italy to coincide with Kant in considering the promptings of the moral law as paramount in ethical psychology.

Gal'lus, Caius Cornelius, abt. 70–26 B.C.; Roman orator; friend of Vergil; distinguished poet and soldier; b. Forum Julii; commanded a division against Antony at Actium, and soon after was sent to Egypt, of which he was governor. Augustus removed him from his position, and the Senate condemned him to exile, with loss of his estates, on which he put

Galofaro (gä-lō-fä'rō). See CHARYBDIS.

Galt, Sir Alexander Tilloch, 1817–93; Canadian statesman; b. Chelsea, England; son of John Galt, author; entered the service of the British and American Land Company, 1833; its manager, 1844–56; member Canadian Parliament, 1849; Finance Minister, 1858–62, 1864–66, under Cartier; principal founder of the railway system of Canada; knighted, 1869; long a member of the Canadian Parliament from Sherbrooke, Quebec; High Commissioner for Canada in England, 1880–83; delegate for Canada in the International Monetary Conference in Paris, 1881; president Alberta Railway & Coal Company, 1889; author of "Canada from 1849 till 1859."

Galt, John, 1779–1839; Scottish author; b. Irvine, Ayr; studied law; spent three years in travel; assisted in the management of *The Star* newspaper; produced a large number of dramas, novels, and other writings, many marked by great originality. Among his best works are "The Ayrshire Legatees," "The Annals of the Parish," "Lawrie Todd," "Life of Byron," and an "Autobiography." He was in Canada as agent for the Canada Company, 1826–29, and founded the town of Guelph, Ontario.

Gal'ton, Sir Douglas, 1822–99; English engineer; b. Worcester; educated at the Royal Military Academy at Woolwich, where he passed the highest examination on record, taking the first prize in every subject. He was commissioned in the Royal Engineers, 1849; inspector of railroads and secretary of the railroad department of the Board of Trade, officially visiting the U. S., 1856; assistant inspector of fortifications, 1860; Under Secretary of State for War, 1862–70, later director of public works and buildings; retired 1875.

Galton, Francis, 1822– ; English scientist; b. Duddeston, Warwick; traveled extensively in Africa; entered the British C Service in the Board of Trade; chairman C mittee of Management of Kew Observato Royal Society, 1889–1900. Besides bo travel, etc., he wrote "Meteorographica," in which he demonstrated the existe established the theory of anticyclo made the first attempt to chart, o scale, the progress of the elemer weather; "The Art of Travel," " Genius," "English Men of Sc Nature and Nurture," "Inquiry Faculty and its Development," " "Deciphering of Blurred Finge

Galup'pi, Balthasare, 170? comic opera; b. near Venice, (whence he is often called cated in the Conservator composed fifty-four opera

Galvani (gäl-vä'nē), *A* 98; Italian physicist; anatomy; accidentally

tricity, 1786, while dissecting a frog, the contact of the legs with his scalpel causing muscular contractions; published "Commentary on the Electrical Forces in Muscular Motion," 1791. A statue of him was erected in Bologna, 1879.

Gal'vanized I'ron, sheet or other iron coated with zinc by dipping it into a bath of melted amalgam of zinc and mercury, containing a little sodium. The iron is first cleansed with sulphuric acid, and is then washed and scoured. Before galvanizing it is usually dusted with sal ammoniac. It is a very useful treatment for iron roofs, telegraph and fence wire, ships' bolts, etc., the zinc acting as a paint.

Galvanom'eter, instrument for measuring the electric current. The tangent galvanometer consists of a circular coil of wire wound on a frame about 30 cm. in diameter. At the center of the coil is placed a compass needle,



ASTATIC GALVANOMETER. TANGENT GALVANOMETER.

below which is a graduated circle. When in use the coil of the instrument is placed N. and S. and the current sent through the coil is measured by the deflection of the needle. The current is proportional to the tangent of the needle's angle of deflection. For the measurement and detection of small currents the astatic galvanometer is sometimes used. Two similar magnetic needles are attached to a vertical rod so that their N. poles point in opposite directions. These are suspended so that the lower needle swings within a coil of wire and the upper needle just above it. When a current is sent through the coil the tendency is to throw the needles out of their position. Galvanometers of the d'Arsonval type differ from those above described in that the magnet is stationary and the coil of wire movable, being suspended by a wire. The plane of the coil is parallel to a line joining the two poles of a permanent magnet N. and S. A current sent through the coil will turn it until the magnetic forces are in equilibrium with the torsional resistance of the suspension wire. The deflections are read by the movement of a beam of light reflected from a small mirror attached to the coil.

Galvan'oplasty, art of separating metals from their chemical compounds and causing them to be deposited on surfaces in various forms by means of dynamical electricity. Its principal divisions are electroplating (*q.v.*) and electrotyping (*q.v.*).

Gal'veston, capital of Galveston Co., Tex.; on Galveston Island, between the Gulf of Mexico and Galveston Bay, 214 m. ESE. of Austin. Galveston stands next to New Orleans in importance as a gulf port, and sixth in the list of ports of the U. S. The domestic exports are cotton, cotton-seed oil, oil cake and meal, wheat, flour, copper, and iron ores, cattle, lumber and timber, and provisions; value of imports were, 1905–6, $5,018,876; exports, $166,317,652. In 1905 there were sixty-seven factories, having aggregate capital of $2,985,755, and products valued at $2,996,654, including foundry and machine-shop products, lumber, cotton-seed oil and cake, bagging, flour, rope, cigars, and ice. Here are vast grain elevators. The exchanges at the clearing house here, 1906, aggregated $318,047,000, an increase in a year of over $36,000,000. Among the educational and charitable institutions are the Univ. of St. Mary's (Roman Catholic), School of Medicine of the State University, and several Roman Catholic academies.

The U. S. Govt. spent $7,190,000 in the construction of jetties at the entrance to the harbor, which secured a deep-water outlet on the gulf coast, with a channel 26–30 ft. deep. The city has a fine beach on the gulf side of the island extending 30 m., and a healthful climate. Galveston was settled 1837; captured by the Federal forces, 1862; retaken by the Confederates, 1863; nearly destroyed by fire, 1885; and on September 8, 1900, visited by a tornado and flood, causing the loss of 7,000 lives and the destruction of $20,000,000 of property. A sea wall on the side of the key fronting the gulf has since been built, and the surface of the city has been elevated over an area of 4 sq. m. Pop. (1900) 37,789. In 1901 the state legislature placed the municipal government of the city under a commission consisting of a mayor and four commissioners, having full charge of the city departments, and elected for two years without regard to politics. This form of government, sometimes called the "Texas idea," has proved most satisfactory, and very much less expensive than previous municipal administrations.

Galvez y Gallardo (găl'văth ē găl-yär'dō), **Bernardo,** 1746–86; Spanish administrator; b. Macharaviaga; Governor of Louisiana, 1779; captured Baton Rouge from the English, 1779, and Mobile, 1780, and after a struggle took Pensacola, 1781; later occupied Jamaica; was named captain general of Louisiana and Florida, and captain general of Cuba; 1783, created Count of Galvez, and, 1785, Viceroy of Mexico.

Gal'way, borough of Ireland; virtually the county of the same name; on Galway Bay, at the mouth of the Corrib; 50 m. NNW. of Limerick; has an excellent harbor, salmon and sea fisheries, and exports of farm products, wool, and black marble; is a Roman Catholic bishopric; contains Queens College, Anglican Church of St. Nicholas (built 1320), Catholic Church of St. Augustine, several monasteries and nunneries, barracks, infirmary, and prison; captured by Richard de Burgh, 1232, by Sir Charles Coote, 1652, and by Gen. Ginkell, 1691.

Ga'ma, Vasco da, abt. 1469–1525; Portuguese navigator; b. Sines. In 1497 he was placed in command of an expedition, fitted out by Emmanuel II of Portugal, with view of reaching the E. Indies by way of Good Hope. The expedition sailed from Lisbon in July, and, doubling the cape, visited Mozambique, Mombasa, Melinda, and Calicut, returning to Lisbon in 1499. Upon his return to Lisbon he was received with great honors—given the title of Admiral of the Indies. In 1502 he was placed at the head of another expedition, and founded establishments at Mozambique and Safala. He also inflicted signal reprisals on the town of Calicut, where the Portuguese residents had been massacred, and established the first Portuguese factory in the Indies. In 1524 he was appointed Viceroy of India.

Gama, or Gra'ma, Grass, large grass of N. and tropical America, culivated as a forage plant in the warm regions of both continents; name is given in the extreme W. of the U. S. to various species of buffalo grass (chiefly *Bouteloua*), which furnish good pasturage.

Gam'ala, a strong fortress and town of Palestine, besieged in vain by Agrippa, but taken by Vespasian after a brave resistance, when the survivors, 9,000 in number, perished. It probably was at El Husn, a steep hill opposite Tiberias, and on the E. side of the Sea of Galilee.

Gama'liel, name of two persons mentioned in Bible history. GAMALIEL, THE ELDER, d. abt. 50 A.D.; was a famous Jewish doctor of the law and Pharisee, instructor of St. Paul. Tradition says he became a Christian, but the Jewish writings, in which his learning, justice, and wisdom are commemorated, do not allude to this conversion. GAMALIEL, THE YOUNGER, abt. 50–116, his grandson; also a famous rabbi, president of the school at Jamnia, and strove to blend Platonism with Judaism.

Gambet'ta, Leon, 1838–82; French statesman; b. Cahors; educated for the Church, but preferred law, and was admitted to the Paris bar, 1859; defended Delesluze, editor of the *Réveil*, for having published the Baudin subscription, and thereby obtained the leadership of the Republican Party; elected member of the Chamber of Deputies, 1869, where he became an irreconcilable Left; opposed the empire and the party that promoted the war with Prussia. When Paris fell into the hands of the Germans, Gambetta established headquarters at Tours, and, with the power of dictator, attempted a fierce resistance against the invaders. After the downfall of the empire, 1870, he took charge of the Department of the Interior and organized, so far as the provinces were concerned, the national defense with great talent and marvelous energy. Later he became the recognized leader of the Left, and in 1881 was made Premier. The reforms he and his colleagues attempted attracted much opposi-

Gam'bia, a deep and powerful river which traverses the region of W. Africa, known as Senegambia; length about 700 m. It falls into the Atlantic at Bathurst.

Gambia, British colony at the mouth of the Gambia River, on the W. coast of Africa; area of colony proper, 69 sq. m.; capital, Bathurst; pop. (1901) 13,456; formed part of the W. African settlements till 1888, when it was erected into a separate colony; exports ground nuts, wax, rice, sweet potatoes, cotton, and rubber.

Gambier (găm'bēr), **James** (Baron), 1756–1833; British naval officer; b. in the Bahamas; commanded the frigate *Raleigh*, and took part in the reduction of Charleston, S. C., 1780; served with distinction against the French, 1781 and 1794; rear admiral, 1795; vice admiral, 1799; admiral, 1805; bombarded Copenhagen, and was made a baron, 1807; one of the commissioners who drew up the Treaty of Ghent, 1814.

Gambier Is'lands, a group of small coral islands in the S. Pacific, about latitude 23° 8′ S. and longitude 134° 55′ W.; belonging to France. The vegetation is luxuriant, and there are numerous birds, but no indigenous quadrupeds. A French mission station was formed on the largest island, Mangareva, 1834.

Gambier, one of several astringent vegetable extracts used in tanning, dyeing, etc.; is the product of a tree which is now placed in the genus *nauclea*, of the family *Rubiaceæ*, to which the Peruvian bark trees belong; it is a native of the E. Indies, and is largely cultivated. Gambier is obtained by boiling the bruised leaves and young shoots in water, and evaporating the decoction.

Gam'bling, the playing of a game or the making of an agreement, for gain, the result of which depends upon a hazard. In the U. S. practically all the states have laws prohibiting gambling, some prohibiting private as well as public games of chance. In the U. S. faro is the popular game with professional gamblers, although roulette is also favored. Poker is probably more widely played in the U. S. than any game. The principal public gambling resort at present is the Casino, at Monte Carlo, the Monaco Company having a concession which will not expire until 1948. Innumerable systems have been devised to win at games of chance, the most popular being the "martingale," in which the player doubles his stake after every loss till a win is made, when he starts a fresh series. The "paroli" is a system by which the player leaves the stake on the table with the amount won with a view to making a double win.

Gamboge (găm-bōj'), or **Camboge',** a yellow gum resin of Siam and Cochin China, produced also in Ceylon. The tree from which it is obtained is the *hebradendron cambogioides*. The gum was first carried to Europe by the

Dutch in 1603. It is imported into the U. S. only from Canton and Calcutta. The manner of collecting it in Siam is to catch in leaves or cocoanut shells the yellow milky juice which exudes from the fractured shoots and leaves of



GAMBOGE TREE.

the tree, and, transferring this to earthen vessels, leave it to thicken. Gamboge is employed as a water color, and also as a medicine. It is a drastic cathartic, and in large doses is an acrid poison, one drachm having produced death.

Gambri'nus, mythical king of Flanders, credited with the invention of beer, whose figure is familiar, usually seated astride a cask, with a tankard of the foaming beverage in his uplifted hand.

Game Laws, statutes which declare what birds and beasts are game, and impose penalties on those who unlawfully destroy them. Since the Norman conquest game has been a subject of legislation in England. A property qualification for the privilege of killing game was long required, but, 1860–61, an excise tax was substituted. Poachers are severely punished, and may be arrested by gamekeepers. The sale of game in England is also strictly regulated. In the U. S., laws have been enacted by most of the states to protect game from pursuit or destruction during certain seasons.

Game'lion, seventh month of the Attic year, so called (from the Greek word meaning "marry") because it was the month in which marriages took place; corresponded with the last half of January and the first half of February.

Game Preserves', large reservations of land set aside by the government or by individuals for the propagation and preservation of game. In Europe the privilege of hunting was reserved for the king and the nobility, and, even to-day in England, so jealously is this privilege guarded that poachers often receive heavier punishments than is dealt out to graver criminals. In the U. S. the right to hunt belongs to the owner of the land, though general laws prohibiting the destruction of game at certain "closed" seasons are enforced for the general good, and efforts are made to preserve such typical animals as the caribou and the bison. Among the largest inclosed game preserves in America are Corbin Park at Newport, N. H., and the Vanderbilt preserves at Biltmore, N. C. The whole island of Anticosti, in the Gulf of St. Lawrence, is a private preserve, and many large tracts in the U. S. and Canada are kept as hunting grounds by clubs of sportsmen.

Games. See SPORTS.

Gam'marus, genus of crustaceans occurring in both fresh and salt water, but without common name except that of beach flea or sandhopper, which they share with most amphipod crustaceans. They are an important element in the food of various fishes.

Gam'ut, in music, name formerly given to the series of notes forming the diatonic scale. The first attempt to adjust in a scientific manner the elements of the diatonic scale is usually ascribed to Guido d'Arezzo, a Benedictine monk of the tenth century. He commenced by adding one note below the lowest then in use. To this new or supplementary note he gave the name of *gamma,* from the third Greek letter. To the six notes of the hexachord he appropriated these syllables, *viz.,* Ut, Re, Mi, Fa, Sol, La, and the scale thus formed (*Si,* for the seventh grade, being added afterwards) acquired the name of the *gamm-ut,* or *gamut.* The scale as thus regulated appears to have embraced two octaves and a sixth in its range, *i.e.,* the original gamut, its repetition in the octave, and six notes of a further series. See SCALE.

Gandamak (găn-dă-mŭk'), village in Afghanistan, between Kabul and Peshawar, where the last remnant of the British force was massacred during the retreat from Kabul, 1842, only one man escaping, and where also the treaty with Yakub Khan was signed, 1879.

Ganesha (gă-nā'shă), the most popular among the Brahmanic gods of the second rank, the special deity of prudence, invoked at the commencement of every enterprise, and with whose name every book begins (*namo Ganeçâya,* "honor to Ganesha") was the son of Siva by Parvati, and the leader of his father's train; represented with an elephant's head, riding on a rat; his figure is found in almost all temples, and also in houses where he has taken the place of the Vedic Agni as domestic guardian.

Gan'ges, river of British India, rising on the S. slope of the Himalaya, and flowing S. and E. into the Bay of Bengal. The Bhagirathi, regarded as its true source, has its origin in Gurhwal, 10,300 ft. above the sea. The stream is first called the Ganges at its junction with the Alaknanda, 120 m. from its source. At Hardwar, 47 m. farther down, the river reaches the great plain of India, here 1,024 ft. above the ocean. Thence to Allahabad, where it joins the Jumna, 488 m., the course is SSE., with fall of 22 in. to the mile. From its con-

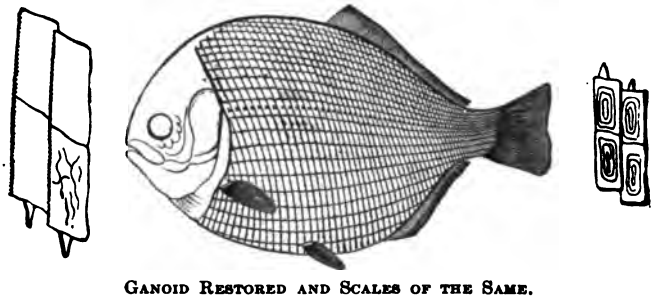
fluence with the Jumna the Ganges winds E. 563 m. to the head of the delta. In this portion the fall is about 5 in. to the mile. The head of the delta is 200 m. from the sea. Three W. offshoots of the main stream unite to form the Hugli, the branch on which Calcutta is situated. The principal stream, retaining the name of Ganges, sends out other branches to the S., which combine and form the Haurin-gotta arm of the delta. Finally, it falls into the Bay of Bengal near the Brahmaputra, but by a separate mouth.

The average descent of the Ganges from the head of the delta is 3 in. per mile. The entire length of the river is 1,500 to 1,600 m. Its depth and width and the rapidity of its flow vary at different seasons. The average width is estimated at 1 m. in the dry season. The section between Hardwar and Allahabad is navigable by small boats and steamers. From Allahabad to the head of the delta the river is safely navigable throughout the year only for vessels drawing no more than 18 in. The Hugli is the only arm which can be ascended by large ships for any considerable distance. The whole delta district is subject to annual inundation. The Ganges is the main artery of an extensive and intricate natural system of Himalayan drainage. Of the nineteen or twenty affluents which it receives after leaving the mountains, twelve are said to be larger than the Rhine.

Gan'glion, in anatomy, a small rounded or elongated nervous mass, situated in the course of the nerves. There are two kinds of nervous ganglia, one forming part of the cranial system of nerves, the other part of the sympathetic system. Ganglia are composed of two substances—one white, like the medullary substance of the brain; the other reddish gray, somewhat resembling the cerebral cortical substance; the internal medullary filaments are the continuation of the nerve upon which the ganglion is situated. The sympathetic system of ganglia is considered as a series of more or less independent centers, giving off nerves to the organs of nutrition or communicating branches to the cerebro-spinal system. The term ganglion is also applied to certain parts of the brain having more or less definite shape and being the seat of certain functions. The nervous system of invertebrate animals is made up wholly of such ganglia united by nerve trunks, or bundles of nerves. In the higher animals the ganglia on the posterior branches of the spinal nerves seem to play an important part in regulating the nutrition of the muscles and body in general. The ganglia of the sympathetic system with their intricate connecting nerve fibers make up the *plexuses,* among which are the cardiac, solar, and hypogastric plexuses, which play an important part in the nutrition and control of the internal organs. This ganglionic connection between the brain and the vessels and viscera produces many physical manifestations as the result of mental states. Emotion causes us to blush or turn pale, *i.e.,* the size of our blood vessels has been changed and their current affected by mental action. Jaundice, even, may be produced by

difference to danger, and the gannet, or solan goose. The latter breeds at a few localities in the British Islands and on the rocky islands near the coast of Labrador, and after the breeding season, in May and June, is found along the Atlantic states to the Gulf of Mexico; it is entirely maritime, and never seen inland unless forced in by violent gales. The length to end of tail is 40 in.; to end of wings, 38; extent of wings, about 6 ft.; bill, 4 in.; weight, 7 lbs. Gannets capture fish by plunging headlong downward from a height of 100 to 200 ft. and transfixing them with their pointed beaks.

Ga'noid Fish'es, an order of fishes characterized by angular, rhomboidal, polygonal, or circular scales composed of horny or bony plates, covered with a thick plate of glossy, enamellike substance. The ganoids were most



GANOID RESTORED AND SCALES OF THE SAME.

numerous in Palæozoic and early Mesozoic times, but are now represented by the *Lepidosteus,* the bony spikes or garpikes of N. American fresh-water lakes; *Amia,* the fresh-water mudfish of N. America; *Acipenser,* the sturgeon; *Scaphirhynchus,* best known by the so-called shovel-nosed sturgeon of the Mississippi basin; and the genus *Polyodon,* or *Spatularia,* the paddlefishes of the Mississippi and the great rivers of China.

Gan'sevoort, Peter, 1749–1812; American military officer; b. Albany, N. Y.; major Second New York Regiment, 1775, and accompanied the army of Montgomery in its invasion of Canada; lieutenant colonel, 1776. While in command of Fort Stanwix, 1777, withstood a siege of nearly three weeks by both the British and Indian forces under St. Leger, and thereby prevented the latter from coöperating with Burgoyne. In 1781 the State of New York appointed him brigadier general, and, 1809, he was appointed to the U. S. army with the same rank.

Gant'let, a running down a lane. "To run the gantlet" is a military punishment, which consists of compelling a culprit to pass through a lane formed of two rows of soldiers, each of whom hits him with a stick or similar weapon as he passes. The term is now applied to any exposure to a series of hostile attacks or criticisms, or to a succession of unpleasant events.

Gan'ymede, in Greek mythology, the beautiful son of Tros and Calirrhoë, stolen by Zeus, who sent his eagle, or came in the shape of an eagle, and took Ganymede to Olympus, to be the cupbearer of the gods.

Gapes, a disease of fowls and other birds, caused by the presence of trematode worms in the windpipe. The number of worms is sometimes so great as to choke the bird. More commonly they cause inflammation and difficulty of breathing. A feather moistened with spirits of turpentine may be turned about in the windpipe till the worms are removed.

Ga'pon, Georges ("FATHER GAPON"), Russian popular leader; b. Poltava; son of a peasant; was sent to the Poltava Ecclesiastical Seminary to be a monk, but was expelled for his liberal ideas; after holding a position as a zemstvo clerk, entered the St. Petersburg Ecclesiastical Seminary, but was placed under limitations which did not permit him to hold a pastorate; after he was ordained, wrote a book on "Christian Socialism," which was suppressed; became a trades-union leader, and by his power of organization and eloquence acquired much influence among working people; established the Workmen's Union, and became known as "Little Father of all the Little Russians"; preached and taught in the neighborhood of St. Petersburg; headed the march to the Winter Palace on "Red Sunday," January 10, 1859; forced to leave the country shortly after the revolution was suppressed; accused of treachery by the Revolutionary Workmen's Tribunal, April, 1906, and mysteriously disappeared; was imprisoned indefinitely, according to one report, by the Holy Synod.

Garaman'tes, ancient name of a people of the desert of Sahara. They were not negroes, and had a town called Garama (now Germa); were warlike nomads, and engaged in the caravan trade across the desert, and their descendants probably exist under other names.

Gar'bo, Raphael del, 1466–1524; Italian painter; b. Florence; had great facility in drawing. There are some beautiful angels by him in a chapel of S. Maria Sopra Minerva at Rome. At Monte Olivete at Florence there is a "Resurrection" with such exquisite little figures that they caused him to be called Raffaellino (little Raphael) del Garbo.

Garcia (gär-sē'ä), **Calixto,** 1836–98; Cuban revolutionist; b. Holquin; was a lawyer; assisted in the attempted revolution known as the Ten Years' War; began operations with 150 men, 1868; captured many towns, and became brigadier general and then commander of the Cuban forces; gained many victories, but in September, 1873, was captured, and deported to Spain; freed, 1878, and returned to Cuba; again captured, and lived seventeen years in Madrid under surveillance; escaped to the U. S., 1895; organized a filibustering expedition in New York; arrested by the U. S.

Govt.; forfeited his bail, and landed in Cuba with a small force; after a number of small victories, captured Victoria de las Yunas, the loss of which occasioned the recall of Gen. Weyler; held the interior of the province of Santiago de Cuba until the U. S. forces arrived, 1898, when he coöperated with them; November, 1898, went to Washington as one of a commission to present to President McKinley the views of the Cuban leaders; died in that city.

Garcia, Manuel, 1805–1906; Spanish vocal teacher; b. Zafra, Catalonia; sang in opera in the U. S., 1825, and in Mexico; aided his father in forming singing classes in Paris, 1829; Prof. in the Conservatoire; 1841, read before the Institute his famous paper, "On the Human Voice"; after the revolution of 1848, removed to England, and taught in London; Prof. in the Royal Academy of Music until 1895; invented the laryngoscope; had among his pupils Jenny Lind, Catherine Hayes, and Mme. Marchesi.

Gar'da, La'go di, ancient *Lacus Benacus*, the largest and one of the most beautiful lakes of N. Italy, on the boundary between the Lombardian and Venetian territories. It is 33 m. long, 10 m. broad, and sends its waters through the Mincio to the Po. On account of its fine climate, and the beauty of its scenery, its shores are lined with elegant villas.

Gar'den, Alexander, 1728–91; Scottish scientist; settled, 1752, at Charleston, S. C., where he acquired much wealth; was an able botanist and zoölogist, and, 1773, was elected to the Royal Society. In 1783, went to England, being a loyalist, and his property was confiscated, but afterwards given to his son.

Garden Cit'y, town of the Borough of Queens, New York City; originally laid out by Alexander T. Stewart; later made the seat of the bishopric of the Protestant Episcopal Diocese of Long Island. The Cathedral of the Incarnation is one of the most beautiful pieces of Gothic architecture in the U. S. It has five organs, which can be played from one keyboard by electrical connections.

Garde'nia (named after Dr. Alexander Garden, of Edinburgh, and Charleston, S. C.), genus of plants of the order *Rubiaceæ*, or madder family, including some of the most beautiful and fragrant shrubs and trees known. Many species are cultivated in greenhouses. Some of these are called Cape jasmine, and came originally from E. Asia and S. Africa.

Gar'diner, James, 1688–1745; British military officer; b. Carriden, Scotland; served in the Dutch and then in the British army; conspicuous in the army of Marlborough; lieutenant colonel, 1730; colonel of the Enniskillens, 1743; commanded a regiment at Prestonpans, where he fell. His death is described in Scott's "Waverley"; his life was written by Dr. Doddridge as an exemplar of piety.

Gardiner, Samuel Rawson, 1829–1902; English historian; b. Ropley, Hampshire; Prof. of

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GARFISH OR GARPIKE.

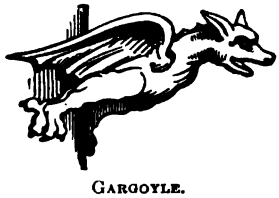
found in the N. lakes and W. and S. rivers, and in tropical America.

Gar'ganey, or **Sum'mer Teal,** wild duck of Europe, Africa, and Asia, highly prized as food; is 16 in. long, and beautifully variegated with white, brown, and green.

Gar'garon, or **Gar'gara,** highest of the three peaks of Mount Ida in the Troad, now called Kaz-Dagh (Snow Mountain). At the foot of Mount Ida lay Gargara, the city, between the promontory and the peak.

Gar'get Root, Poke, or **Skoke,** large perennial herb of the U. S.; useful in veterinary practice, and has some power as an alterative. The berries afford a rich but fugitive purple; employed in France for coloring wines; but the berries share in the poisonous properties of the plant. Several species growing in China, India, Cayenne, Chile, etc., share the properties of this plant, and are used as pot herbs.

Gar'goyle, in architecture, the carved lower end or outlet of the water spout from the roof of a building. In mediæval times these were often curiously shaped in imitation of men, beasts, birds, and fanciful creatures.



GARGOYLE.

Garibal'di, Giuseppe, 1807–82; Italian patriot; b. Nice; brought up as a mariner, but took part in the Young Italian Movement, 1833–34, and driven into exile; served in the French army; went to S. America, 1836; aided the revolted province of Rio Grande against Brazil, and the Republic of Uruguay against Buenos Ayres; returned to Italy, 1848; commanded volunteers in the war against Austria; offered his sword to the Republic of Rome; with Gen. Roselli, had supreme command, and was foremost in the defense of Rome against French intervention, 1849. On the fall of the city he escaped with 3,000 followers, and attempted to penetrate to Venice, but was obliged to disperse his troops; lived for a time on the island of Caprera; in 1850, came to the U. S. and worked in a candle factory; returned to Italy, 1854; in 1859, organized the band of the Alpine Chasseurs that made the whole Lombard campaign; in May, 1860, landed in Sicily with 1,000 comrades, defeated the Bourbon troops, took Palermo and Messina, and became dictator of Sicily. In August he won a victory at Reggio in Calabria, entered Naples, and was proclaimed dictator of the Two Sicilies. Aided by Piedmontese troops, he gained a victory at Volturno; on the annexation of the Two Sicilies to that part of Italy governed by Victor Emmanuel, retired to the island of Caprera; entered the Chamber of Deputies, 1861; in May, 1862, undertook for Venice the expedition of Sarnico, which was prevented by the Italian Govt.; then that of Rome, which ended in the battle of Aspromonte, where he was taken prisoner. He was amnestied, December, 1862, and returned to Caprera, but, 1866, again took the field, and won some victories; in 1867, joined the insurgents on the Roman frontier, defeated the papal troops at Monterotondo, October 25th, and marched on Rome, but was defeated by the French and papal army at Mentana; was for some time a prisoner; during the Franco-German War, aided the French, commanding a corps called the "Volunteers of the Vosges"; returning to Caprera, published three romances of little importance; in 1875, became a member of the Italian Parliament.

Garigliano (gä-rēl-yä'nō), river of S. Italy; largest and most important stream of the Neapolitan provinces; receives the waters of Lago di Fucina; enters the Mediterranean 9 m. E. of Gaeta. It is the Liris of the ancients, separating Latium from Campania, and is reputed for its muddy waters and fat eels. On its banks the French were routed by the Spaniards, 1503.

Gar'lic, the bulb of the *allium sativum,* a plant of the same genus as the onion and the leek. It is perennial, and grows wild in S. Europe, but its native place is not known. It is cultivated in most countries, and has been esteemed from the remotest times as a food or as a condiment. It has a strong odor called alliaceous, and a bitter and acrid taste. As a medicine it is most employed in external applications, as a sedative in fevers, and in nervous and spasmodic disorders of children.

Gar'net, the name of a mineral species, presenting many varieties; also a section of the silicates; in geology, the name of a rock made up of some variety of the mineral. Garnet crystals are twelve sided, rhomboidal and trapezoidal, and variously modified forms. The hardness of garnet is from 6.5 to 7.5; sp. gr., 3.15 to 4.3. It is either red, brown, black, yellow, white, or green, with a vitreous or resinous luster. There are six species: (1) the alumina-lime garnet, (2) alumina-magnesia, (3) alumina-iron, (4) alumina-manganese, (5) iron-lime, and (6) lime-chrome. Crystals of garnet are common in the granite rocks and the metamorphic slates and limestones. The Oriental garnet, or almandine (so called from the city of Alabanda, where it was anciently

wrought), is found in alluvial soil, into which it has been washed out of its matrix, in Pegu, Siam, Ceylon, and India. When very large, as is frequently the case, it is cut with a flat base and convex upper surface, and is then termed a *carbuncle*. The pyrope, or Bohemian garnet, found chiefly in Austria and Germany, is smaller, less splendid in tint, more common, and less esteemed. Spessartite has been found in Amelia Co., Va., in large masses of great beauty, yielding fine gems up to ninety-six carats each, of rich wine color or hyacinth red. Rose garnet, a beautiful rose-red grossularite, has also come into notice from Xalostoc, Mexico; it is not transparent, but when cut and polished in slabs makes a fine ornamental material. The garnet was frequently engraved upon by artists of the Roman Empire; one of the finest specimens of antique skill, the head of Sirius in the Marlborough collection, is on a garnet. This stone was also a favorite gem with the engravers of the Sassanian period, but is rarely employed now, owing to its hardness and brittleness.

Gar'nett, Richard, 1835–1906; English author and philologist; b. Litchfield; son of Richard Garnett, assistant keeper of printed books in the British Museum; assistant in same department, 1851–75; assistant keeper of same and superintendent of the reading room, 1875–84; keeper of printed books, 1890–99; edited the Museum "Catalogue," 1881–90; published "Io in Egypt and Other Poems," "Idylls and Epigrams," "The Twilight of the Gods and Other Tales," "History of Italian Literature," "Essays in Librarianship and Bibliography," "William Shakespeare, Pedagogue and Poacher," etc.

Garnier (gär-nē-ā'), **Marie Joseph François,** 1839–73; French explorer; b. St. Étienne; entered the French navy; served through the war with China, 1860–62; appointed to a civil office in French Cochin China; commanded an exploring expedition from Cambodia to Shanghai by way of Yunnan; took part in the defense of Paris, 1870–71; resumed exploration in China; killed after capturing Hanoi, in the Tonkin War; published "Exploration of Indo China."

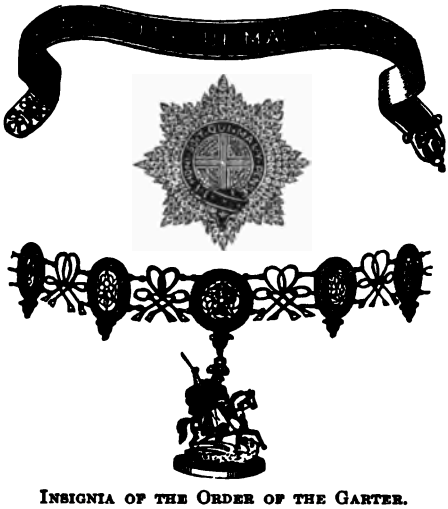
Garnier-Pagès (pä-zhās'), **Louis Antoine,** 1803–78; French statesman; b. Marseilles; during the reign of Louis Philippe was a member of the Chamber of Deputies; Minister of Finances in the provisional government of the republic. When the empire was established, returned to private life until 1864, when he was elected to the Corps Législatif; reëlected, 1870; wrote an "Episode of the Revolution of 1848," "History of the Executive Commission," "History of the Revolution of 1848."

Gar'nishment, a process of attachment by which a creditor obtains the security of property belonging to his debtor which is in the possession of third persons. It consists in a *warning* or notification given to the person holding the property, who is called a *garnishee*, commanding him not to make payment or delivery to the debtor, but to be in readiness to answer the plaintiff's claim by retaining the

Royal Institution. His papers on the anatomy and classification of birds will ever remain of service to ornithologists.

Garrote', form of capital punishment employed in Spanish dominions. A metallic collar is put around the neck of the victim, and a screw at the back of the collar is turned in such a way that its point touches the spinal cord, causing instant death. Originally a stout cord was tied about the neck, and the culprit was strangled by twisting the cord with a stick (*garrote*). Robbery, accompanied by choking of the person robbed, is often called *garroting*.

Gar'ter, Or'der of the, the most illustrious British order of knighthood, founded, 1344, by King Edward III. The common tradition is that King Edward was dancing with the Countess of Salisbury at a ball, when she let fall her garter, which the king at first tied about his own leg; but, observing that the act excited much attention, he restored it to the



INSIGNIA OF THE ORDER OF THE GARTER.

fair owner, exclaiming: *Honi soit qui mal y pense*—"Evil be to him who evil thinks"—words which are still the motto of the order. The knights of the order write K. G. after their names. The distinguishing badges are the collar, badge, star, garter, George, and lesser George; there are also a mantle, surcoat, hood, hat, and plume appropriate to the order. In strict language the knights are termed "knights of the Golden Garter," or "knights of the most noble order of St. George and the Garter."

Garth, Sir Samuel, 1660–1719; English poet and physician; b. Bolam, Durham; removed to London, 1693; physician to George I and physician general of the army; became a Whig leader; knighted, 1714. He is chiefly remembered for his satirical poem, "The Dispensary," 1699, directed against the selfishness of the apothecaries who opposed the gratuitous distribution of medicines to the poor.

Gar'vie. See SPRAT.

Ga'ry, industrial city at Indiana harbor, Lake Co., Ind.; projected 1906 by the U. S. Steel Corporation; and designed to have the largest steel plant in the world, comprising sixteen vast furnaces, eighty-four open-hearth furnaces, and six finishing mills; also large docks, and homes for the operatives and others, accommodations for a population of 100,000 being made; city named after Elbert Henry Gary, chairman of the Board of Directors of the Steel Corporation. Pop. at time of incorporation (July, 1906) 334; pop. (1909) 15,000.

Gas, a permanently elastic fluid—permanently elastic, that is, under the usual atmospheric conditions, and thus distinguished from a *vapor*, which is the aëriform condition of a substance normally existing in the liquid or solid state. By a *fluid* in this definition is designated a condition of matter, in which the particles have great freedom of motion—a condition common both to gases and liquids. By *elastic* is meant a condition in which the material particles are in a state of tension, and in consequence of this tension exert pressure against every surface with which the body comes in contact. For rules governing the equilibrium and motion of gases, see PNEUMATICS. The different gases are described under their own names.

The word gas is also commonly used to designate illuminating gas, especially as employed for lighting houses and streets and as fuel. Illuminating gas may be made by the destructive distillation of coal followed by the condensation of the volatile products with the separation of water, tar, and other condensable matters, and the purification of the gas by the removal of carbon dioxide, hydrogen disulphide, etc., by scrubbers and washers. This product is called *coal gas*. It has been largely superseded, especially in the U. S., by *water gas*, which is produced in great volume and with great rapidity from a comparatively compact apparatus, whose first cost is much less than that for coal gas. It is made by passing steam, *i.e.*, vapor of water, over incandescent coal, which causes the steam to decompose with the formation of hydrogen and carbon monoxide, which mixture is then enriched or carbureted by passing the gas through some substance rich in carbon, as naphtha. *Natural gas* (*q.v.*) is the mixture of gaseous hydrocarbons resulting from the decomposition of animal or vegetable matter in nature, and has been used for lighting or as a fuel in many of the cities and towns of the Middle West. The making of *wood gas* was made practicable, 1849, by Petten Kofer, who showed that a higher heat than hitherto used was required, by which means a large quantity of heavy hydrocarbon gases was produced. It is successfully made in Germany, where thoroughly dried wood is first converted into empyreumatic vapors in one kind of retorts, and then into permanent gases in others. Gas of good quality is also made near Munich from peat, in a manner similar to that for wood. Resin yields a gas of high illuminating power. Petroleum is used for making il-

luminating gas quite largely in Germany, Austria, and Russia, and yields about thirty-three per cent of heavy hydrocarbons. Oil gas is made from the fixed oils, such as rape and hemp oils, and the fatty materials resulting from washing woolens in soap.

Every section of a gas works has one or more meters for measuring the volume of gas before it passes into the reservoirs. They are in the form of cylinders, usually about 12 ft. in diameter and from 8 to 12 ft. long, consisting of an outer cylinder or drum, and an inner revolving cylinder with four spiral apartments of measured capacity, and a central one which receives the gas and delivers it to the spirals, which again deliver it to the space between the cylinders, from which it passes to the gas holders, the large cylindrical structures so conspicuous about gas works. From the reservoir it is carried in cast-iron main pipes through the streets, and in small wrought-iron pipes into buildings, where it is used not only for lighting, but for cooking, for purposes of annealing, hardening, assaying, enameling, etc., in mints, watch, and jewelry manufactories, for firing china; for tempering needles, blades, springs, and screws; for melting linotype and similar metals; for tinning pipe and stopcocks; for drying out tobacco; for roasting coffee and peanuts; for burnishing photographs; and many other purposes.

The profitable consumption of gas, whereby the strongest light can be had at the least expenditure of gas, depends considerably upon the form of the burner, and the mode by which the flame is fed with the air necessary for its combustion. In the Argand burner a circle of small holes supplies the gas, and a current of air is admitted through the center of the flame, which is surrounded by a glass chimney. In the Welsbach incandescent lamp the light is produced by causing the burning gas to raise to white heat what is known as the mantle, suspended over the burner. The mantle consists essentially of cotton fabric steeped in a solution of salts of such metals as thorium, cerium, yttrium, lanthanum, magnesium, etc., and when the thread has been burned away there remains a skeleton of the oxides of the metals used.

Gascoigne (găs-koin'), **George**, 1525–77; English poet; b. Bedford; distinguished as a dramatist, but being disinherited by his father, took ship for Holland, 1572, where he served with distinction, but was made prisoner by the Spaniards, who sent him back to England. He was "the first English satirist" and "the first English critic in poesy"; now chiefly remembered for "The Steele Glas," 1576, a blank-verse satire, and "The Complaynt of Philomene," a rhyming elegy.

Gascoigne, William, d. 1419; English jurist; Chief Justice abt. 1400; according to tradition, a version of which is given in Shakespeare's "Henry IV," he arrested and punished young Prince Henry, who had violated the dignity of the court.

Gas'cony, old province of France, between the Pyrenees, the Garonne, and the Atlantic,

in making air gas. Gasoline is used in large quantities in carburetors. These are machines in which air is made to bubble through the gasoline and dissolve a sufficient amount of the volatile liquid to form a combustible mixture, which may be burned like ordinary illuminating gas, or used for explosion in cylinders of motors, after the manner in which gas is exploded in the cylinders of gas engines.

Gaspé (gäs-pā'), **Philip Aubert de,** 1786–1871; Canadian author; b. Quebec; became a lawyer and student of Canadian folklore and traditions; wrote "Old-time Canadians," an exceedingly popular work, and "Memoirs."

Gaspé, district, cape, and town in Quebec province, Canada; on the end of the peninsula which extends into the Gulf of St. Lawrence; between the St. Lawrence River and Chaleur Bay. The name is often applied to the peninsula itself. The cape is a towering rampart of sandstone 690 ft. high. Gaspé town is the headquarters of immense cod and mackerel fisheries. Its attractive scenery, cool summer climate, and the excellent trout and salmon fishing in neighboring streams, make the town a favorite resort for sportsmen.

Gassendi (gä-sän-dē'), **Pierre,** 1592–1655; French philosopher; b. Champtercier, Provence; was a precocious son of a poor peasant; Prof. of Theology at Digne, of Philosophy at Aix, and of Mathematics at Paris; corresponded with Galileo, Hobbes, Kepler, and Descartes; opposed the Aristotelian scholastic philosophy, and by his championship of Epicurianism was charged with infidelity; espoused the cause of physical science.

Gastein Conven'tion, a convention concluded at Wildbadgastein (August 14, 1865) between Austria and Prussia, and intended to regulate the relations of the two powers with respect to the duchies, Schleswig, Holstein, and Lauenburg, which they had taken from Denmark, and then occupied in common. By the convention they agreed that Schleswig should be placed entirely under Prussian, Holstein entirely under Austrian administration, while Lauenburg should be annexed to Prussia, Austria ceding its part of it for 2,000,000 thalers.

Gasterop'oda, class of mollusks distinguished by the under side of the body forming a single muscular foot, on which the animal creeps or glides. The snails, limpets, and chitons are examples of the class, of which there are fully



GASTEROPOD (*Helix desertorum*).

20,000 different species. They usually have a coiled spiral shell, although in the slugs this shell has degenerated to a small internal scale-like plate, and in the chitons or armadillo snails the shell consists of eight plates which enable the animal to roll up like an armadillo when disturbed. The forward end of the body is developed into a well-marked head, bearing the mouth and a complicated mechanism for gathering and masticating food, together with two pairs of tentacles, one pair of which carries the eyes. Slime exudes from the surface of the body, which gives protection against heat and drought, and enables the animal to slip along more readily.

Gaston de Foix (gäs-tōń' dė fwä), 1489–1512; French general; nephew of Louis XII of France; became Duke of Nemours, 1505; led the army of Louis XII in Italy; vanquished the besiegers of Bologna; defeated the army of Venice near Brescia, and took the city by storm; won the great battle of Ravenna (April 11, 1512), and by rash exposure after the victory was killed on the same day.

Gas Wells. See NATURAL GAS; PETROLEUM.

Gatacre (gāt'ā-kėr), **Sir William Forbes,** 1843– ; English military officer; joined the army, 1862; instructor of surveying, Royal Military College, 1875–79; Deputy Adjutant and Quartermaster General, Hazara Expedition, 1888, and in the Burma Tonhon Expedition, 1889. He led the British forces in the Sudan, 1898; later commanded a division against Khartum and Omdurman; in the war in S. Africa, was repulsed at Stormberg with heavy loss. In April, 1900, was recalled, and received the Order of Knight of the Grand Cross of the Indian Empire; knighted, 1896.

Gate Cit'y, popular designation of Atlanta, Ga.; first applied by Jefferson Davis during the Civil War, who regarded it as the most important inland military point in the South.

Gate of A'sia, fortified city of Kasan, Russia; center of commerce between Siberia, Bokhara, and Russia.

Gate of Tears, translation of Bab el Mandeb; applied to the straits of that name because of the numerous shipwrecks there.

Gates, Horatio, 1728–1806; American military officer; b. Malden, England; early entered the British army; was an officer under Braddock; 1763 settled in Virginia; accompanied Washington to Cambridge, 1775, as adjutant general; and June, 1776, received the chief command of the army which had just retreated from Canada. March, 1777, superseded Schuyler in the command of the N. army; was superseded by him in May, and reinstated by Congress, August 4th. The surrender of the British army at Saratoga gave him a brilliant military repute; and in the following winter the "Conway Cabal" intrigued to transfer the chief command from Washington to him. June, 1780, he was appointed to command the S. forces. After the disastrous battle of Camden (August 16th) he was superseded by Greene, but restored, 1782, after the surrender of Cornwallis. In 1790, having emancipated his slaves, he settled in New York.

